MOXY® FM

BUSINESS RADIO

MOTOROLA

service manual

68P81036E10-O

MOTOROLA

MOXY

Two-Way FM Radio

25—28 MHz
29.7—50 MHz

Instruction Manual

68P81036E05—O

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USER QUESTIONNAIRE

To the User of This Instruction Manual:

Motorola is engaged in a continuous program of improving its instruction literature. We believe that you can aid us in this program, so that we in turn can better help you service our equipment. To foster these aims, would you please answer the following questions:

First Fold

SCHEMATIC DIAGRAMS AND CABLING DIAGRAMS

First Fold

1. ☐ Are accurate and easy to follow
2. ☐ Contain minor errors
3. ☐ Contain major errors
4. ☐ Are difficult to follow

If you have checked any box except 1, please tell us what schematic diagrams, or portions thereof, were at fault, or enter other comments.*

_____

_____

68P85901D80-J

TEXT

1. ☐ Easy to follow – helps to service equipment
2. ☐ Would like more information on*

Second Fold _____ Second Fold

_____

3. ☐ Some instruction sections are too long or superfluous such as*

_____

_____

4. ☐ Other comments*

_____

_____

_____

(continued on reverse side)

PARTS LIST

1. ☐ Are complete and accurate
2. ☐ Would like more information as follows*

_____

_____

ILLUSTRATIONS IN GENERAL

1. ☐ Are complete and accurate
2. ☐ Want more illustrations such as*

_____

_____

3. ☐ Some are superfluous such as*

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The name of my instruction manual is:

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My name is _____

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***Whenever possible, give complete model No. of equipment, and part No. of diagram or part No. of instruction section. This information is important.**

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AVAILABLE BACKGROUND REFERENCE PUBLICATIONS

Three reference publications are available to provide background information needed to service some of the newer Motorola products more effectively. The information in these publications is not duplicated in our instruction manuals. To obtain your free copy, check the ones you want and return this self–mailer to us. (NOTE: One copy of each publication has already been distributed to Motorola Service Shops (MSS's) and field technical representatives (FTR's).

First Fold

First Fold

Check item desired:

☐ **Basic Logic Circuit Guide** 68P81105E88

Describes the basic logic circuits used in Motorola Communications digital equip–ment and the logic notational scheme used in our instruction manuals.

68P81028E93–C

☐ **"Digital Private–Line" Binary–Coded Squelch** 68P81106E83

Contains fundamentals of "Digital Private–Line" system operation, circuit operation and servicing techniques.

☐ **Safe Handling of CMOS Integrated Circuit Devices** 68P81106E84

Describes special handling techniques needed to prevent irrepairable damage from static charges encountered with normal handling of CMOS devices.

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To the User of this Manual:

Many servicemen have asked for smaller manuals with more servicing information on the schematic diagrams.

This manual uses a new approach which we feel fulfills this desire. The circuit descriptions and circuit maintenance data are now incorporated on the schematic diagram (or on a facing page).

First Fold

This new approach makes the manual smaller as well as easier to use because it puts the information at the serviceman's fingertips.

First Fold

We would appreciate hearing how you like the new approach after you have used the manual a few times. Please take a few minutes to give us your comments.

EPS–17831–B

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MOXY
TWO-WAY FM RADIO

25-28 MHz
29.7-50 MHz

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MOTOROLA INC.
Communications Division

service publications
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68P81036E05-O
4/25/77-NPC

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TMN1008A, TMN1009A, TMN1010A, & TMN1011A Desk Microphone Schematic Diagram, Circuit Board Detail, and Parts List 68P81030E06

SPECIFICATIONS

GENERAL				
MAXIMUM BATTERY DRAIN @ 13.8 V	MODEL	TRANSMIT	RECEIVE	STANDBY (SQUELCHED)
	25-WATT	5.5 A	1.0 A	0.3 A
FREQUENCY RANGE		25-28, 29.7-50 MHz		
DIMENSIONS		2¼" H x 6½" W x 8½"D		
WEIGHT		1.75 kg (3.8 lbs.)		

TRANSMITTER	
RF POWER OUTPUT	25 WATTS
SPURIOUS & HARMONIC EMISSIONS	60 dB below carrier
OUTPUT IMPEDANCE	50 ohms
FREQUENCY STABILITY	±0.002%; −30°C to +60°C (+25°C reference)
MODULATION	16F3
AUDIO SENSITIVITY	160 mV ±3 dB for 3.0 kHz deviation at 1000 Hz
FM HUM & NOISE	−60 dB below ±3.0 kHz deviation at 1000 Hz
AUDIO RESPONSE	+1, −3 dB of 6 dB/octave pre-emphasis from 300 to 3000 Hz.
AUDIO DISTORTION	Less than 3%

RECEIVER	
CHANNEL SPACING	20 kHz
SELECTIVITY-EIA SINAD	−65 dB @ ±20 kHz
EIA SINAD INTERMODULATION	−65 dB
EIA MODULATION ACCEPTANCE	±6.0 kHz
SENSITIVITY	0.35 uV or less for 20 dB quieting. 0.3 uV or less for 12 dB sinad.
OSCILLATOR STABILILTY	±0.002%; −30°C to +60°C (+25°C reference)
SPURIOUS & IMAGE REJECTION	Greater than 70 dB
SQUELCH THRESHOLD SENSITIVITY	Less than 0.2 uV
AUDIO OUTPUT	3 watts, with less than 5% distortion
AUDIO RESPONSE	+2, −8 dB/octave de-emphasis from 300 to 3000 Hz.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

FCC TRANSMITTER LICENSE DESIGNATIONS

SINGLE FREQUENCY: CC1131
TWO FREQUENCY: CC1132

FCC RECEIVER CERTIFICATION NUMBERS

SINGLE FREQUENCY: RC0171
TWO FREQUENCY: RC0173

MOTOROLA

MODEL CHART

FOR

"MOXY"

FM TWO-WAY RADIO

25-50 MHz

25-WATT RF POWER

+12 VOLT MOBILE

117 V AC BASE STATION

CODE:

X = ONE ITEM SUPPLIED WITH EACH RADIO

/ = ONE ITEM SUPPLIED DEPENDENT UPON FREQUENCY

2 = NUMBER INDICATES QUANTITY SUPPLIED WITH EACH RADIO

ITEM	DESCRIPTION	MODEL NUMBER	NUMBER OF OPERATING FREQUENCIES	SQUELCH TYPE
			MOBILE MODELS	
*TUB1461AB	UNIFIED CHASSIS (25-28 MHz) NON-EXTENDER	D31GMA1000AK	1	CARRIER
*TUB1462AB	UNIFIED CHASSIS (29.7-36 MHz) NON-EXTENDER	D31GMA1300AK	2	CARRIER
*TUB1463AB	UNIFIED CHASSIS (36-42 MHz) NON-EXTENDER	D31GMA2000AK	1	CARRIER
*TUB1464AB	UNIFIED CHASSIS (42-50 MHz) NON-EXTENDER	D31GMA2300AK	2	CARRIER
TUB1461AH	UNIFIED CHASSIS (25-28 MHz) NON-EXTENDER	D31GMA3000AK	1	"PRIVATE-LINE"
TUB1462AH	UNIFIED CHASSIS (29.7-36 MHz) NON-EXTENDER	D31GMA3300AK	2	"PRIVATE-LINE"
TUB1463AH	UNIFIED CHASSIS (36-42 MHz) NON-EXTENDER	D31GMA4000AK	1	"PRIVATE-LINE"
TUB1464AH	UNIFIED CHASSIS (42-50 MHz) NON-EXTENDER	D31GMA4300AK	2	"PRIVATE-LINE"
TUB1471AB	UNIFIED CHASSIS (25-28 MHz) EXTENDER	D31GMA6000AK	1	"DIGITAL PRIVATE-LINE"
TUB1472AB	UNIFIED CHASSIS (29.7-36 MHz) EXTENDER	D31GMA8300AK	2	"DIGITAL PRIVATE-LINE"
TUB1473AB	UNIFIED CHASSIS (36-42 MHz) EXTENDER	D31GMA8000AK	1	"DIGITAL PRIVATE-LINE"
TUB1474AB	UNIFIED CHASSIS (42-50 MHz) EXTENDER	D31GMA8300AK	2	"DIGITAL PRIVATE-LINE"
*TUB1471AH	UNIFIED CHASSIS (25-28 MHz) EXTENDER		BASE STATION MODELS	
*TUB1472AH	UNIFIED CHASSIS (29.7-36 MHz) EXTENDER	I41GMB1100AM	1	CARRIER
*TUB1473AH	UNIFIED CHASSIS (36-42 MHz) EXTENDER	I41GMB1130AM	2	CARRIER
*TUB1474AH	UNIFIED CHASSIS (42-50 MHz) EXTENDER	I41GMB1400AM	1	CARRIER
TRN6904A	ENCODER, DECODER, "PRIVATE-LINE"	I41GMB1430AM	2	CARRIER
TRN6906A	ENCODER DECODER, DIGITAL PRIVATE-LINE	I41GMB3100AM	1	"PRIVATE-LINE"
TPN1136A	POWER SUPPLY, 110 V	I41GMB3130AM	2	"PRIVATE-LINE"
THN6321A	HOUSING	I41GMB3400AM	1	"PRIVATE-LINE"
TAB6061A	ANTENNA, MOBILE ROOF-TOP (25-28 MHz)	I41GMB3430AM	2	"PRIVATE-LINE"
TAB6062A	ANTENNA, MOBILE ROOF-TOP (29.7-36 MHz)	I41GMB6100AM	1	"DIGITAL PRIVATE-LINE"
TAB6063A	ANTENNA, MOBILE ROOF-TOP (36-42 MHz)	I41GMB6130AM	2	"DIGITAL PRIVATE-LINE"
TAB6064A	ANTENNA, MOBILE ROOF-TOP (42-50 MHz)	I41GMB6400AM	1	"DIGITAL PRIVATE-LINE"
TMN1008A	MICROPHONE, DESK, "PRIVATE-LINE"	I41GMB6430AM	2	"DIGITAL PRIVATE-LINE"
TMN1009A	MICROPHONE, DESK, CARRIER SQUELCH			
TMN6130A	MICROPHONE, MOBILE			
TKN6794A	POWER CABLE			
TRN6223A	BASE TRAY			
TRN6709B	VIBRASPONDER" RESONANT REED			
TRN6899A	HARDWARE, 1-FREQ., "PRIVATE-LINE"			
TRN6910A	HARDWARE, 2-FREQ., "PRIVATE-LINE"			
TRN8206A	HARDWARE, 2-FREQ., CARRIER SQUELCH			
TRN8018A	HARDWARE, 1-FREQ., EXTENDER			
TRN8019A	HARDWARE, 2-FREQ., EXTENDER			
TRN8020A	HARDWARE, 1-FREQ., "PRIVATE-LINE" EXTENDER			
TRN8021A	HARDWARE, 2-FREQ., "PRIVATE-LINE" EXTENDER			
TRN6005A	CODE PLUG			
KXN6158AA	CRYSTAL, TRANSMITTER			
KXN6159AA	CRYSTAL, RECEIVER			
TRN6902A	SWITCHEON, 1-FREQ.			
TRN6903A	SWITCHEON, 2-FREQ.			
TRN8022A	SWITCHEON, 1-FREQ., EXTENDER			
TRN8023A	SWITCHEON, 2-FREQ., EXTENDER			
TKN6005A	INSTALLATION KIT, MOBILE			

* - REFER TO UNIFIED CHASSIS MODEL BREAKDOWN CHART FOR LOWER LEVEL KITS

EP6-24388-O

MOTOROLA

UNIFIED CHASSIS

MODEL BREAKDOWN CHART

FOR

MOXY

FM TWO-WAY RADIO

25-28, 29.7-50 MHz

25 WATT RF POWER

12 V MOBILE

117 V AC BASE STATION

CODE

[X] - ONE ITEM SUPPLIED WITH EACH RADIO

MODEL NUMBER	DESCRIPTION	ITEM	DESCRIPTION
TLB8361A	MAIN CIRCUIT BOARD (25-28 MHz) 1-FREQ., NON-EXTENDER	TUB1461AH	UNIFIED CHASSIS 25-28 MHz 1-FREQ., NON-EXTENDER
TLB8362A	MAIN CIRCUIT BOARD (29.7-36 MHz) 1-FREQ., NON-EXTENDER	TUB1462AH	UNIFIED CHASSIS (29.7-36 MHz) 1-FREQ., NON-EXTENDER
TLB8363A	MAIN CIRCUIT BOARD (36-42 MHz) 1-FREQ., NON-EXTENDER	TUB1463AH	UNIFIED CHASSIS (36-42 MHz) 1-FREQ., NON-EXTENDER
TLB8364A	MAIN CIRCUIT BOARD (42-50 MHz) 1-FREQ., NON-EXTENDER	TUB1464AH	UNIFIED CHASSIS (42-50 MHz) 1-FREQ., NON-EXTENDER
TLB8371A	MAIN CIRCUIT BOARD (25-28 MHz) 2-FREQ., NON-EXTENDER	TUB1471AH	UNIFIED CHASSIS 25-28 MHz 2-FREQ., NON-EXTENDER
TLB8372A	MAIN CIRCUIT BOARD (29.7-36 MHz) 2-FREQ., NON-EXTENDER	TUB1462AH	UNIFIED CHASSIS (29.7-36 MHz) 2-FREQ., NON-EXTENDER
TLB8373A	MAIN CIRCUIT BOARD (36-42 MHz) 2-FREQ., NON-EXTENDER	TUB1463AH	UNIFIED CHASSIS (36-42 MHz) 2-FREQ., NON-EXTENDER
TLB8374A	MAIN CIRCUIT BOARD (42-50 MHz) 2-FREQ., NON-EXTENDER	TUB1464AH	UNIFIED CHASSIS (42-50 MHz) 2-FREQ., NON-EXTENDER
TLB8381A	MAIN CIRCUIT BOARD (25-28 MHz) 1-FREQ., EXTENDER	TUB1461AH	UNIFIED CHASSIS (25-28 MHz) 1-FREQ., EXTENDER
TLB8382A	MAIN CIRCUIT BOARD (29.7-36 MHz) 1-FREQ., EXTENDER	TUB1462AH	UNIFIED CHASSIS (29.7-36 MHz) 1-FREQ., EXTENDER
TLB8383A	MAIN CIRCUIT BOARD (36-42 MHz) 1-FREQ., EXTENDER	TUB1463AH	UNIFIED CHASSIS (36-42 MHz) 1-FREQ., EXTENDER
TLB8384A	MAIN CIRCUIT BOARD (42-50 MHz) 1-FREQ., EXTENDER	TUB1464AH	UNIFIED CHASSIS (42-50 MHz) 1-FREQ., EXTENDER
TLB8391A	MAIN CIRCUIT BOARD (25-28 MHz) 2-FREQ., EXTENDER	TUB1471AH	UNIFIED CHASSIS 25-28 MHz 2-FREQ., EXTENDER
TLB8392A	MAIN CIRCUIT BOARD (29.7-36 MHz) 2-FREQ., EXTENDER	TUB1472AH	UNIFIED CHASSIS (29.7-36 MHz) 2-FREQ., EXTENDER
TLB8393A	MAIN CIRCUIT BOARD (36-42 MHz) 2-FREQ., EXTENDER	TUB1473AH	UNIFIED CHASSIS (36-42 MHz) 2-FREQ., EXTENDER
TLB8394A	MAIN CIRCUIT BOARD (42-50 MHz) 2-FREQ., EXTENDER	TUB1474AH	UNIFIED CHASSIS (42-50 MHz) 2-FREQ., EXTENDER
TLB1512A	POWER AMPLIFIER, 25-WATT (25-28 MHz)		
TLB1522A	POWER AMPLIFIER, 25-WATT (29.7-36 MHz)		
TLB1523A	POWER AMPLIFIER, 25-WATT (36-42 MHz)		
TLB1524A	POWER AMPLIFIER, 25-WATT (42-50 MHz)		
TTN6030A	HARDWARE KIT, MAIN CIRCUIT BOARD		

EPS-24389-O

SAFETY INFORMATION

The United States Department of Labor, through the provisions of the Occupational Safety and Health Act of 1970 (OSHA), has established an electromagnetic radiation safety standard which applies to any two-way mobile radio equipment. Normal use of this radio will result in exposures far below the OSHA limit. There are no reported incidents of physical damage resulting from the use of this type radio. However, the following precautions are recommended.

DO NOT operate the transmitter when someone outside the vehicle is within two feet of the mobile antenna.

DO NOT operate the transmitter near unshielded electrical blasting caps or in an explosive atmosphere.

EPS-18196-B

RADIO ACCESSORY TABLE

KIT NUMBER	DESCRIPTION
TMN6113A	HANDSET
TRN6319A	HANDSET HANG-UP BOX
TRN6912A	REVERSE ESCUTCHEON, 1-FREQ. RADIOS
TRN6913A	REVERSE ESCUTCHEON, 2-FREQ. RADIOS
TRN6025A	EXTERNAL SPEAKER
TRN6223A	BASE STATION MOUNTING TRAY WITHOUT MICROPHONE CLIP
TRN6318A	BASE STATION MOUNTING TRAY WITH MICROPHONE CLIP
TRN6524A	SECURITY MOUNTING HARDWARE
TRN6525A	RADIO-TO-TRUNNION QUICK MOUNTING SCREWS
TRN5992A	LOCKING TRUNNION
TRN8026A	REVERSE ESCUTCHEON, 1-FREQ., RADIOS WITH EXTENDER
TRN8027A	REVERSE ESCUTCHEON, 2-FREQ., RADIOS WITH EXTENDER

FOREWORD

1. SCOPE OF MANUAL

This manual is intended for use by experienced technicians familiar with similar types of equipment. It contains all service information required for the equipment described and is current as of the printing date. Changes which occur after the printing date are incorporated by Instruction Manual Revisions (SMR). These SMR's are added to the manuals as the engineering changes are incorporated into the equipment.

2. MODEL AND KIT IDENTIFICATION

Motorola equipments are specifically identified by an overall model number on the nameplate. In most cases, assemblies and kits which make up the equipment also have kit model numbers stamped on them. When a production or engineering change is incorporated, revision suffix numerals are added to the affected kit model number. For example, a TLN4448A becomes a TLN4448A-1 with the first revision, TLN4448A-2 with the second revision, etc.

As diagrams are updated, information about the change is incorporated into a revision column. This revision column appears in the manual next to the parts list or, in some cases, on the diagram. It lists the reference number, part number, and description of the parts removed or replaced when the suffix number changed. With this information, the technician can find the information for the current version, and any previous version, of the equipment covered by the manual.

3. SERVICE

Motorola's National Service Organization offers one of the finest nation-wide installation and maintenance programs available to communication equipment users. This organization includes approximately 800 authorized Motorola Service Stations (MSS) located throughout the United States, each manned by one or more trained, FCC licensed technicians.

These MSS's are independently owned and operated and were selected by Motorola to service its customers. Motorola maintenance is available on either a time and material basis or on a periodic fixed-fee type arrangement.

The administrative staff of this organization consists of national, area and district service managers and district representatives, all of whom are Motorola employees with the objective to improve the service to our customers.

Should you wish to purchase a service contract for your Motorola equipment, contact your Motorola Service Representative, or write to:

National Service Manager
Motorola Communications Division
1303 E. Algonquin Road
Schaumburg, Illinois 60196

4. REPLACEMENT PARTS ORDERING

Motorola maintains a number of parts offices strategically-located throughout the United States. These facilities are staffed to process parts orders, identify part numbers, and otherwise assist in the maintenance and repair of Motorola Communications Division products.

Orders for all parts *except* crystals, channel elements, and "Vibrasender" ® and "Vibrasponder" ® resonant reeds should be sent to the nearest area parts center. Orders for instruction manuals should also be sent to the area parts center.

When ordering replacement parts or equipment information, the complete identification number should be included. This applies to all components, kits, and chassis. If the component part number is not known, the order should include the number of the chassis or kit of which it is a part, and sufficient description of the desired component to identify it.

Orders for crystals, channel elements, active filters, code plugs, and reeds should be sent directly to the factory address listed on the following page. Crystal and channel element orders should specify the crystal or channel element type number, crystal and carrier frequency, and the chassis model number in which the part is used.

Orders for active filters, code plugs, "Vibrasender" and "Vibrasponder" resonant reeds should specify type number and frequency, and should identify the owner/operator of the communications system in which these items are to be used.

5. ADDRESSES

5.1 GENERAL OFFICES

MOTOROLA, INC.
Communications Group Parts Dept.
1313 E. Algonquin Rd.,
Schaumburg, Illinois 60196
Phone: 312-576-6521
Executive Offices: 1303 E. Algonquin Rd.,
Schaumburg, Illinois 60196

5.2 U.S. ORDERS

WESTERN AREA PARTS
1170 Chess Drive, Foster City,
San Mateo, California 94404
Phone: 415-349-3111
TWX: 910-375-3877

MIDWEST AREA PARTS
10 W. North Ave.,
Lombard, Ill. 60148
Phone: 312-620-3000
TWX: 910-693-1592

MID-ATLANTIC AREA PARTS
6701 Elkridge Landing Road,
Linthicum, Maryland 21090
Phone: 301-796-8600

EAST CENTRAL AREA PARTS
12995 Snow Road,
Parma, Ohio 44130
Phone: 216-267-2210
TWX: 810-421-8845

EASTERN AREA PARTS
85 Harristown Road,
Glen Rock, New Jersey 07452
Phone: 201-447-4000
TWX: 710-988-5602

PACIFIC SOUTHWESTERN AREA PARTS
2333 Utah Avenue,
El Segundo, California 90245
Phone: 213-644-1101
TWX: 910-348-6278

SOUTHWESTERN AREA PARTS
3320 Belt Line Road,
Dallas, Texas 75234
Phone: 214-241-2151
TWX: 910-860-5505

SOUTHEASTERN AREA PARTS
5096 Panola
Industrial Blvd.
Decatur, Georgia 30032
Phone: 504-981-9800
TWX: 810-751-8300

5.3 CANADIAN ORDERS

CANADIAN MOTOROLA ELECTRONICS COMPANY
Parts Department
3125 Steeles Avenue, East M2H 2H6
Willowdale, Ontario
Phone: 416-499-1441
TWX: 610-492-2713
Telex: 065-25191

5.4 ALL COUNTRIES EXCEPT U.S. AND CANADA

MOTOROLA, INC. OR MOTOROLA AMERICAS, INC.
International Parts Dept.
1313 E. Algonquin Road
Schaumburg, Illinois 60196 U.S.A.
Phone: 312-576-6492
TWX: 910-693-1592 or 1599
Telex: 722443 or 722424
Cable: MOTOL

5.5 FACTORY ADDRESS FOR CRYSTAL, CHANNEL ELEMENT, ACTIVE FILTER, CODE PLUGS AND RESONANT REED ORDERS

AIR MAIL ORDERS
Motorola, Inc.
Component Products Sales & Service
P.O. Box 66191
O'Hare International Airport
Chicago, Ill. 60666

REGULAR MAIL ORDERS AND CORRESPONDENCE
Motorola, Inc.
Component Products Sales & Service
2553 N. Edgington Street
Franklin Park, Illinois 60131

OPERATOR'S INSTRUCTIONS

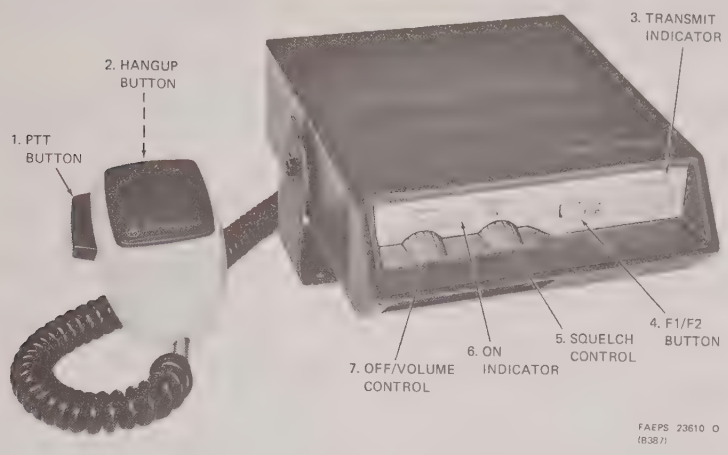


Figure 1. Operating Controls and Indicators

1. TO TURN ON RADIO

Refer to Figure 1. The on-off switch for the radio set is operated by the OFF-VOLUME control (7). To turn on the radio set, rotate the OFF-VOLUME control knob clockwise until a click is heard. The front panel lamp then turns on to illuminate the control labels and the green ON indicator (6).

2. TO RECEIVE

	OPERATION	PROCEDURE
1.	Disable PL (PL models only)	Remove microphone from hang-up clip.
2.	Unsquelch radio	Turn SQUELCH control (5) counterclockwise until noise is heard.
3.	Set VOLUME control	Adjust VOLUME control for a comfortable listening level.
4.	Set SQUELCH control	Turn SQUELCH control clockwise until noise just stops.
5.	Select operating frequency. (Two-frequency models only)	Press F1/F2 button (4), as needed.
	The radio is now adjusted to receive *all* messages on the selected frequency.	
6.	Enable PL (PL models only)	Return microphone to hang-up clip.
	You are now able to hear messages for your system only.	

3. TO TRANSMIT

3.1 MOBILE STATION

IMPORTANT NOTE

When operating in extremely cold ambient conditions (-10 to -30°C), allow 2 minutes after radio is turned on before transmitting. This will ensure compliance with FCC rules and regulations.

	OPERATION	PROCEDURE
1.	Disable PL (PL models only)	Remove microphone from hang-up box.
2.	Select operating frequency (Two-frequency models only)	Press F1/F2 button, as needed.
3.	Listen	DO NOT TRANSMIT if anyone is using the channel.
4.	Key transmitter	Press and hold down microphone PTT button (1). Red TRANSMIT light on radio front panel (3) will glow indicating that the transmitter is "on-the-air".
5.	Transmit message	Hold microphone about 2 inches from your lips and speak slowly into microphone at a normal voice level. Shouting will not make your message easier to understand. Make each transmission as brief as possible.
6.	Receive reply	Release microphone PTT button.
7.	Enable PL at end of conversation (PL models only)	Return microphone to hang-up clip.

3.2 BASE STATION

	OPERATION	PROCEDURE
1.	Select operating frequency (two-frequency models only)	Press F1/F2 button, as needed.
2.	Monitor the radio channel	Depress the microphone MONITOR switch.
3.	Listen	Briefly listen for conversations on the radio channel.
4.	Transmit the message	If the radio channel is not in use, depress and hold both the microphone MONITOR and TRANSMIT switches while speaking about 6 inches from the microphone. Speak distinctly and at a normal level. Release the TRANSMIT switch at the end of the message or to receive a reply.
5.	Enable receiver muting (carrier squelch models)	At the end of the message or conversation release the microphone MONITOR switch.

NOTE

If JU2 is removed from the microphone (normal for paging base station to ensure that the operator monitors the channel) both the microphone transmit and monitor buttons must be pressed to transmit -- releasing either switch ends the transmission.

PREINSTALLATION INSTRUCTIONS

1. UNPACKING

When unpacking the radio from its shipping carton, refer to the model chart at the front of this manual. If any item is missing, contact your Motorola representative immediately.

2. LICENSING REQUIREMENTS

FCC Regulations state that a station license must be obtained for each radio installation (mobile or base) by the owner of the equipment. The station licensee is responsible for ensuring that the transmitter power, frequency, and deviation are within the limits permitted under the station license. Adjustments to the transmitter section of the radio may be made only by a technician possessing an FCC commercial operator's license. No license is required to install, check out, or operate the radio.

3. BENCH CHECK

3.1 INTRODUCTION

Each radio set is adjusted, tested, and inspected before shipment. However, it is recommended that both the transmitter and receiver sections of the radio be checked for proper operation just prior to installation.

3.2 TESTING

The radio should be tested with all cables and accessories supplied with the radio connected as they will be in the final installation. The frequency, deviation, and output power of the transmitter should be checked, as well as the sensitivity, squelch operation, and audio quality of the receiver. Radios with PL or DPL capabilities should be operated in that mode to verify proper encode/decode performance. Refer to the Specifications page at the front of this manual to determine whether the radio is operating properly. Improper operation can generally be corrected by touching up the receiver or transmitter alignment.

4. INSTALLATION PLANNING - MOBILE RADIOS

4.1 GENERAL

Planning is the key to fast, easy radio installation. Before a hole is drilled or a wire is run, inspect the vehicle and determine how and where you intend to mount the antenna, radio set, and accessories. Plan wire and cable runs to provide maximum protection from pinching, crushing, and overheating.

4.2 ANTENNA MOUNTING

The best mounting location for the antenna is in the center of a large, flat conductive surface. In almost all vehicles these requirements are best satisfied by mounting the antenna at the center of the roof. Some vehicles have a large trunk lid that will provide a good antenna location. If the trunk lid is used, connected grounding straps between the trunk lid and vehicle chassis to insure that the trunk lid is at chassis ground.

4.3 RADIO MOUNTING

4.3.1 General

The trunnion mount allows the radio set to be mounted to a variety of mounting surfaces. Be sure the mounting surface is able to adequately support the weight of the radio. Allow sufficient space around the radio for free air flow for cooling. Be sure the unit is close enough to the vehicle operator to permit easy access to the operating controls.

4.3.2 Inverted Escutcheon Installation

A front panel escutcheon with inverted lettering (Motorola Option B96) is available if you plan to mount the radio above the operator's normal line of sight. Install the inverted escutcheon as follows:

Step 1. Remove the radio chassis from its housing.

Step 2. Using a long screwdriver, push on the back of the upright escutcheon until it is free of the radio housing front panel.

Step 3. Remove the tape from the back of the inverted escutcheon. Press the inverted escutcheon onto the radio housing front panel.

Step 4. Pull the pushbutton off the F1/F2 switch. Invert the pushbutton and replace it on the switch.

Step 5. Reinstall the radio chassis into the housing. Be sure the chassis locking tabs properly engage the slots in the housing.

4.4 DC POWER AND WIRING

4.4.1 This radio must be operated *only* in negative-ground electrical systems. Reverse polarity will

not damage the radio, but the cable fuse will blow. Check the vehicle ground polarity before you begin installation to prevent wasted time and effort.

4.4.2 Connect the red power lead through F601 to the vehicle battery positive terminal. Connecting the red lead to any other positive voltage point in the vehicle is *not recommended*.

CAUTION

If dc power is to be controlled by the vehicle ignition switch, a switching relay (Motorola Part No. 59-813674) should be used to switch the red power lead. The vehicle ignition switch, then, controls dc to the relay coil.

4.4.3 Connect the black power lead to a good ground point on the vehicle chassis. *Do not* connect the black lead directly to the battery negative terminal.

4.4.4 The wiring provided with the radio is of sufficient size to handle the maximum radio current demand. If wiring must be added to that provided, be sure the gauge of the added wire is sufficient for the current to be carried and length of the added run.

5. INSTALLATION PLANNING - BASE STATIONS

5.1 ANTENNA SYSTEM

Selecting the antenna system for your base radio depends on factors beyond the scope of this manual. Your Motorola representative can help you choose the antenna system that will best serve your particular needs.

5.2 RADIO LOCATION

Choose a location for your base radio as close as possible to where the antenna cable enters the building. Be sure 117 volt, 60 Hz power is available. Make sure sufficient air can flow around the radio to permit adequate cooling.

INSTALLATION INSTRUCTIONS

1. MOBILE RADIOS

Step 1. Mount the antenna, using the instructions provided with the antenna kit. Run the coaxial cable to the intended radio set mounting location. Cut off the excess cable and install the cable connector.

Step 2. Route power wiring, but do not make power connections and do not tie the wires down. Be sure to use grommets wherever the wiring must pass through a metal panel.

Step 3. Mount the radio set trunnion mounting bracket. See Figure 2.

Step 4. Mount the microphone hang-up clip. If mounting surface is not at chassis ground, use the black wire supplied with the radio to connect the hang-up clip to a convenient ground point.

Step 5. Connect the power plug and coaxial cable connector to the radio set. See Figure 3. Install the radio in the trunnion mounting bracket.

Step 6. Complete the power wire installation. Be sure to leave sufficient slack wire behind the radio set to make the unit easy to remove and reinstall. Strap the wire down where necessary being sure the wires do not make contact with hot areas on the engine. Be sure the wires cannot be snagged by the operator's feet or during normal vehicle operation. Cut off the excess power lead length and attach the terminal lugs supplied.

Step 7. If an external speaker is used, secure wiring to the speaker as needed. Allow sufficient slack in wiring for future maintenance.

Step 8. Connect the power leads. Be sure the connection points are clean and free of paint, dirt, and corrosion.

Step 9. Test radio and its accessories for proper system operation, and check the antenna SWR.

CAUTION

After installation, remove the protective film from the escutcheon. To remove any dust accumulation from the escutcheon, wipe with a damp cloth.

2. BASE STATIONS

Step 1. Mount the radio set to the base mounting tray.

Step 2. Prepare radio set power leads as follows: Attach the provided pins to the ends of the red and black power leads. Insert power leads into the mating plug of the base station power supply output jack; red lead pin into position 4 and the black lead pin into position 1. (See Fixed Station Power Supply section of this manual.)

Step 3. Connect an SWR meter between the radio antenna connector and the antenna system.

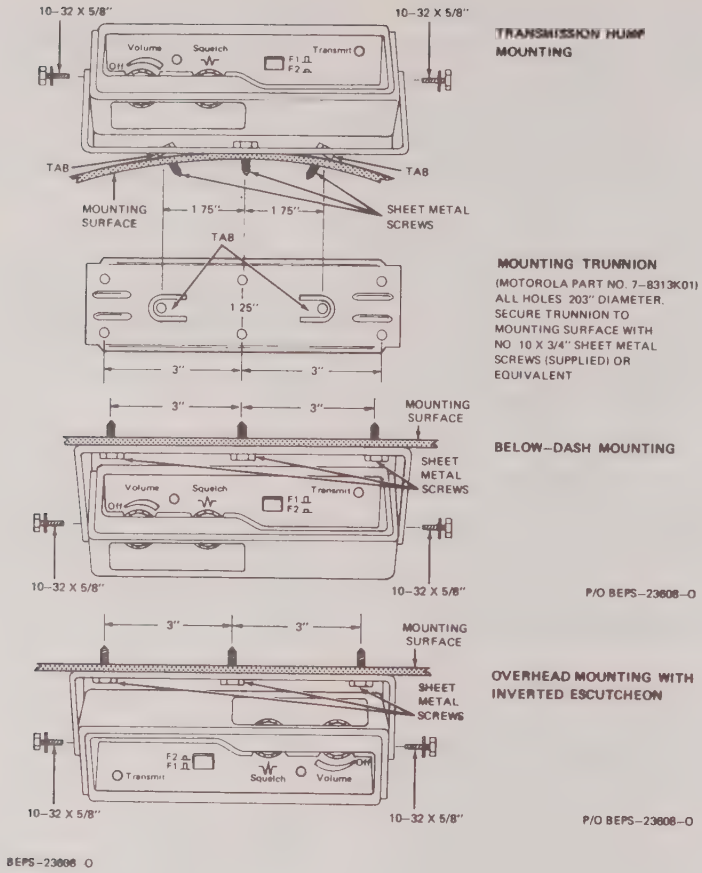


Figure 2. Radio Mounting Detail

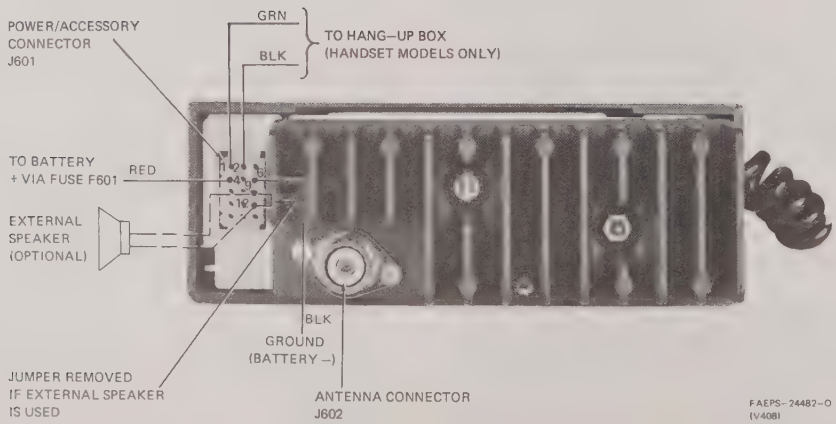


Figure 3. Connections to Radio Set Rear Panel

Step 4. Plug the base dc power supply into the 117 volt, 60 Hz outlet. Set the AC POWER switch on the power supply to the ON position.

Step 5. Key the transmitter and check the antenna system SWR. If the SWR is 2.5 or lower, disconnect the wattmeter and connect the antenna coaxial cable to the radio set antenna jack. (An SWR reading higher than 2.5:1 indicates a problem in the antenna system. Check for a shorted or open transmission line and be sure the correct antenna is being used.)

Step 6. Test the radio set and accessories for proper operation. A brief conversation with a mobile unit in your system will indicate whether the base station is operating satisfactorily.

CAUTION

After installation, remove the protective film from the escutcheon. To remove any dust accumulation from the escutcheon, always wipe with a damp cloth.

SERVICE

1. INTRODUCTION

This radio is designed for easy servicing. Numerous test points are provided on the radio circuit board. For servicing information, refer to the schematic diagrams, circuit board details, and alignment procedures in this manual. Theory of operation is shown on the schematic diagrams.

NOTE

Integrated circuits in the optional "Digital Private- Line" circuit are CMOS devices. Refer to instruction section on Handling Precautions for CMOS in this manual before attempting to service the DPL board.

2. HOUSING REMOVAL

(Refer to Figure 3)

Step 1. Remove the screws that hold the radio set in the trunnion mount.

Step 2. Insert a screwdriver blade into the screwdriver slot near the bottom of the radio chassis rear panel.

Step 3. Push the screwdriver against the housing until the chassis locking tabs clear the slots in the radio housing.

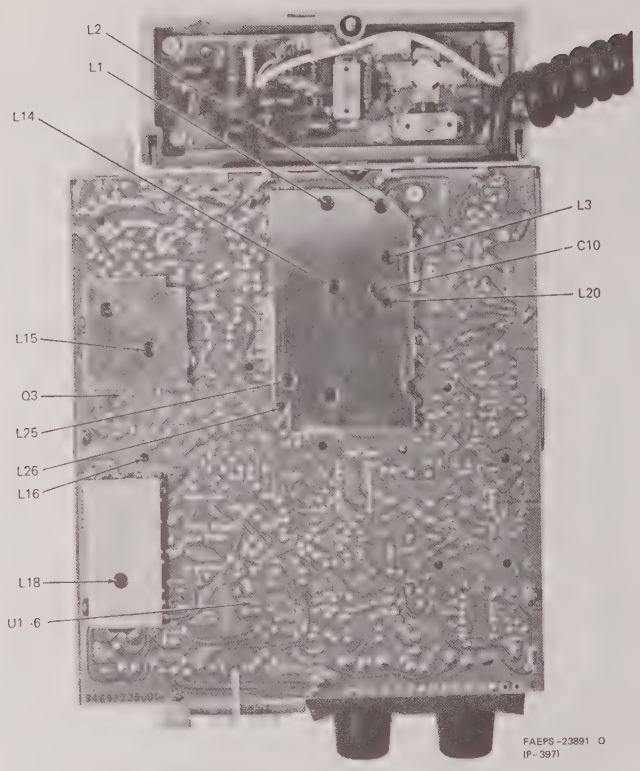
Step 4. Slide the radio chassis out the back of the housing.

3. POWER PLUG WIRE REPLACEMENT

A special wire extraction tool (Motorola model number ST1145) is available to remove wires from power plug P601. The tool must be used for ease of wire extraction and to prevent damage to the connector or its pins.

REQUIRED TEST EQUIPMENT FOR "MOXY" RADIO SERVICING

GENERAL TYPE	APPLICATION	RECOMMENDED MODEL	MIN. SPECIFICATIONS
DC Voltmeter	DC voltage measurements, general	Motorola T1009A	Measurement range: 0-15 V dc Sensitivity: 20,000 ohms/volt
VTVM or DVM	DC voltage readings requiring a high input resistance meter.	Motorola S1063B	Measurement range: 0-15 V dc Input resistance: 11 megohms
AC Voltmeter	Audio voltage measurements	Motorola S1053C	Measurement range: 0-10 V ac Input resistance: 10 megohms
RF Voltmeter	RF voltage measurements	Motorola S1339A	Measurement range: 100 uV-3 V from 1 MHz-200 MHz Inputs: 50 ohm and high impedance
Oscilloscope	Waveform observation	Telequipment Model D61	Vertical sensitivity: 10 mV-10 V/ division Horizontal time base: 1 usec. -1 sec/ division
RF Wattmeter	Transmitter output power measurement	Motorola Wattmeter with appropriate element and T1013A RF Dummy Load	Measurement ranges: 0-50 Watts from 25-60 MHz
Frequency Meter	Transmitter frequency measurement	Motorola S-1327 Series, S-1343 Series, or S-1344 Series	Measurement range: 10-100 MHz Frequency resolution: 10 Hz
Deviation Meter	Transmitter modulation deviation measurement	Motorola S1323A or Motorola S1325A	Measurement range: 0-10 kHz deviation Frequency Range: 10-100 MHz
RF Signal Generator	Receiver alignment and troubleshooting	Motorola S1318A	Frequency Range: 25-54 MHz Output Level: 0.1 uV-100,000 uV Must be capable of at least ± 3 kHz deviation when modulated by 1 kHz tone.
Audio Signal Generator	Audio circuit troubleshooting	Motorola S1067B	Frequency Range: 20 Hz - 20 kHz Output Level: 50 mV - 1 V
PL Tone Generator	"Private-Line" Encoder-Decoder troubleshooting	Motorola SLN6221A	Frequency Range: 50 Hz - 200 Hz Output Level: 0-500 mV
DPL Test Set	"Digital Private-Line" Encoder-Decoder troubleshooting	Motorola SLN6413A	



Receiver Adjustment Locations

RECEIVER METERING WITH
20,000 OHM/VOLT VOLTMETER

METERING POINT	VOLTMETER LEAD CONNECTIONS		VOLTMETER SCALE	TYPICAL READINGS
	+	−		
2ND IF AMPL. SIGNAL LEVEL	TP1	CHASSIS GROUND	2.5 V DC	.25—.5V (NO SIGNAL) 1.75 V (30 uV INPUT)
QUADRATURE DETECTOR OUTPUT	TP2	CHASSIS GROUND	10 V DC	5.5 V ± .2 V

PREALIGNMENT N

1. On "Digital Privat
microphone hangup

2. In some cases, pea
where the slug is ne

3. Unnecessary tunin
alignment. Comple

   a. After changing

   b. After replacing

4. Before beginning a

   a. Set L1, L2, L3,

   b. Set L14, 15 and

   c. Set L18 slug 5 t

5. Receiver frequency

   $f_{osc} = f_c + 10.7$ M

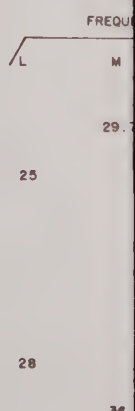
   Where f_c = carrier

6. Two-frequency rad

TEST EQUIPMENT

1. Metering may be ac
page.

2. Connect a dc power



RECEIVER

OTES

e-Line'' and ''Private-Line'' radio sets disable the DPL or PL decoder by ungrounding the) button.

k meter readings may occur at two points in the tuning range of a coil. Always choose point arest the top of the coil form (away from the circuit board).

g adjustments should be avoided. Usually, the receiver will require only a ''touch-up'' te receiver alignment is necessary in the following cases:

the receiver operating frequency.

a component in a frequency-sensitive network.

complete receiver alignment, preset tuning adjustments as follows:

and L20 according to the graph shown below.

16 slugs 7½ turns from tops of coil forms.

urns from top of coil form.

calculations:

MHz

frequency and f_{osc} = oscillator crystal frequency.

os should be tuned on the lower operating frequency.

SET-UP

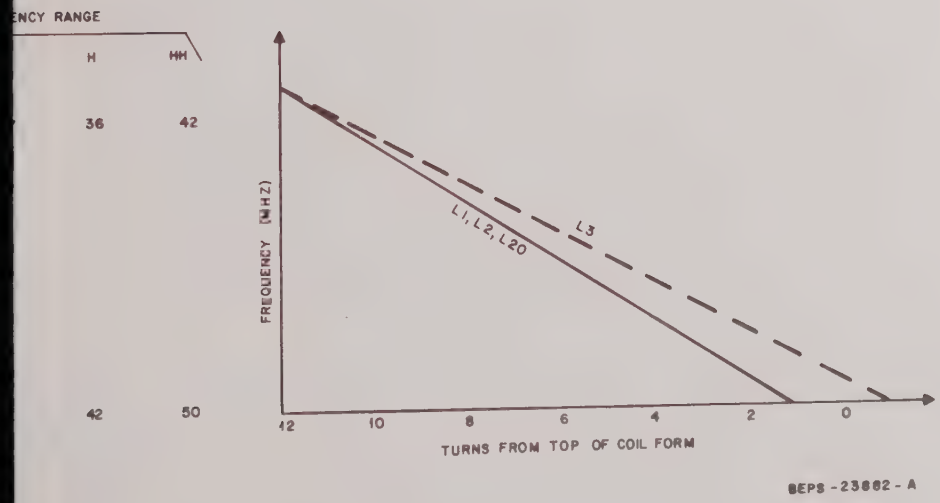
complished with a 20,000 ohm-per-volt voltmeter. Refer to the voltmeter metering table on this

supply to the power leads of the test cable. Set the power supply output to 13.8 volts.

F1-F2 FREQUE SEPARATIO
150 kHz
150 to 300 kH
300 kHz to 650
650 kHz to 900
900 kHz OR GRE

STEP
1 QUADRATURE DETECTOR
2 I.F. STRIP
3 INJECTION OSCILLATOR FREQUENCY (SELECT APPROPRIATE PROCEDURE)
4 PRESELECTOR
5 I.F. FINE TOUCH-UP

NOTES: 1. REDU
2. TO SE



Receiver Tuning Coil Preset

1. Connect an a
2. On DPL or P
3. Turn the SQ
4. Turn on the
5. Connect an
and set the g
6. Slowly increa
7. Note the sign

SELECTING TUNE-UP FREQUENCY
WIDE-SPACE RECEIVERS

NCY N	PROCEDURE
	TUNE-UP ON LOWEST FREQUENCY.
z	1. FOR NO DEGRADATION, USE CENTER TUNE-UP ELEMENT. 2. FOR ALLOWABLE 3 dB DEGRADATION (0.5 uV) ON F2, TUNE-UP ON F1.
‹Hz	1. FOR ALLOWABLE 3 dB DEGRADATION (0.5 uV), USE CENTER TUNE-UP ELEMENT. 2. FOR ALLOWABLE 6 dB DEGRADATION (0.7 uV) ON F2, TUNE-UP ON F1.
‹Hz	FOR ALLOWABLE 6 dB DEGRADATION (0.7 uV), USE CENTER TUNE-UP ELEMENT.
ATER	CONSULT MOTOROLA REPRESENTATIVE

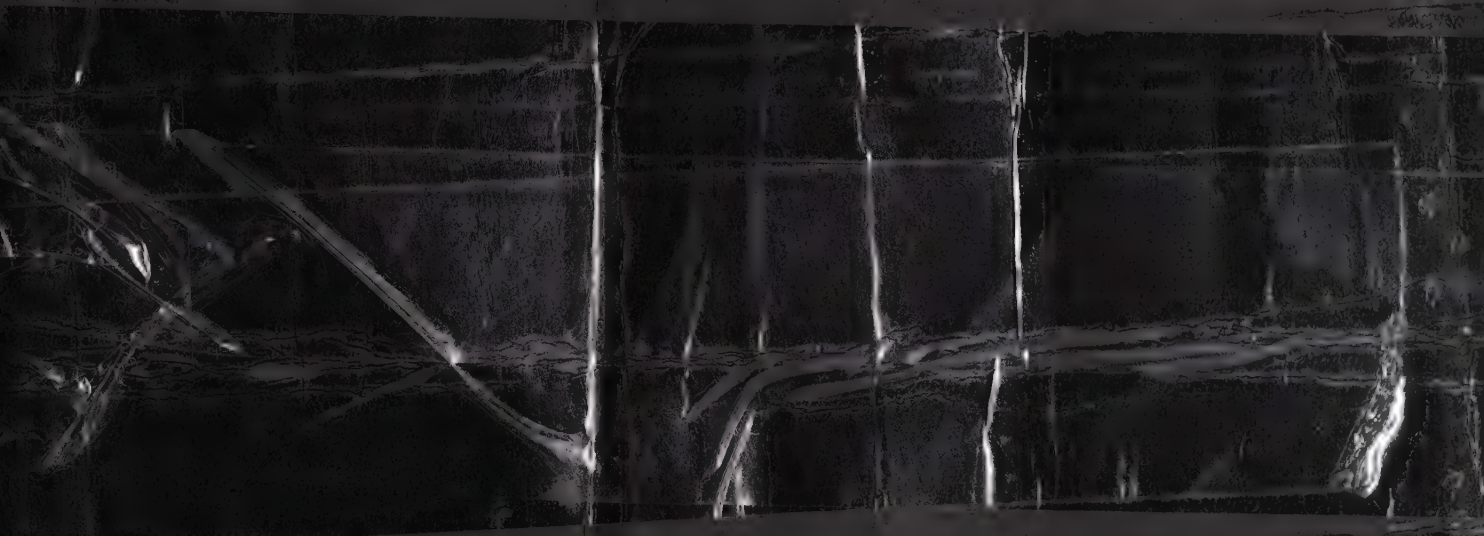
RECEIVER ALIGNMENT

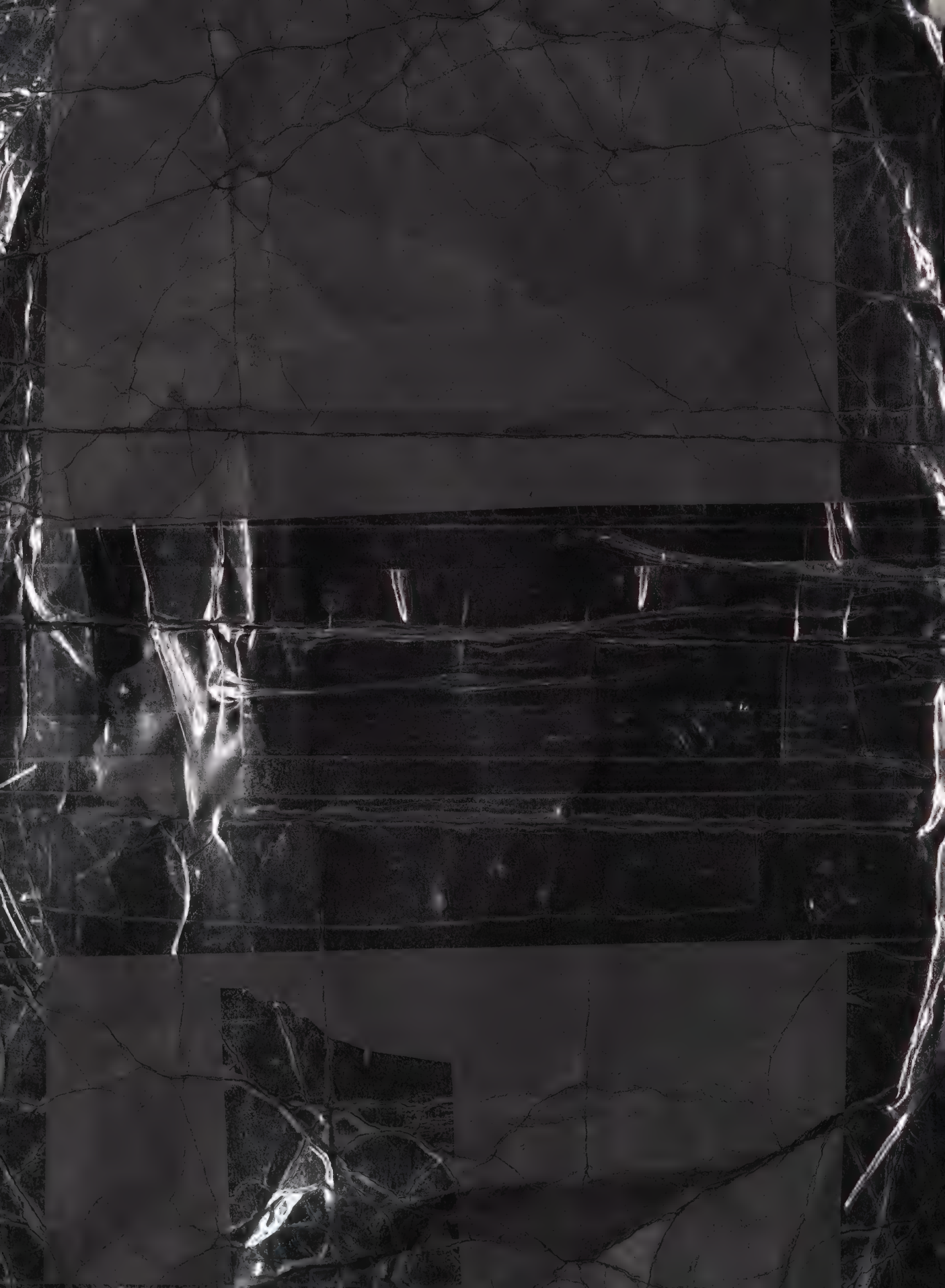
INPUT SIG.	INPUT POINT	ADJUST	METER	READING
10.7 MHz @ 1 mV	NEAR Q3 ALLOW TO "SPRAY" INTO CIRCUIT	L18	VOM OR VTVM AT TP2	5.5 VDC
10.7 MHz (NOTE 1)	ANTENNA CONNECTOR	L14, 15 & 16	TP1 (VOM 20k/ VOLT)	PEAK, THEN REPEAK
—	—	L25 (F1) L26 (F2)	FREQ. COUNTER THROUGH .01uF CAPACITOR TO L20 CENTER TAP	CRYSTAL FREQUENCY
CARRIER FREQ. AND 10.7 MHz ADJUST LEVEL TO HEAR BEAT NOTE	ANTENNA CONNECTOR	L25 (F1) L26 (F2)	RADIO SPEAKER	ZERO BEAT
CARRIER FREQUENCY (NOTE 1, 2)	ANTENNA CONNECTOR	L1, 2, 3 & 20	TP1	PEAK, THEN REPEAK
CARRIER FREQUENCY (NOTE 1, 2)	ANTENNA CONNECTOR	L14, 15 & 16	TP1	ZERO BEAT PEAK, THEN REPEAK. FINE ADJUST: L15—3/4 TURN CCW, L14—3/4 TURN CCW. THEN REPEAK L16

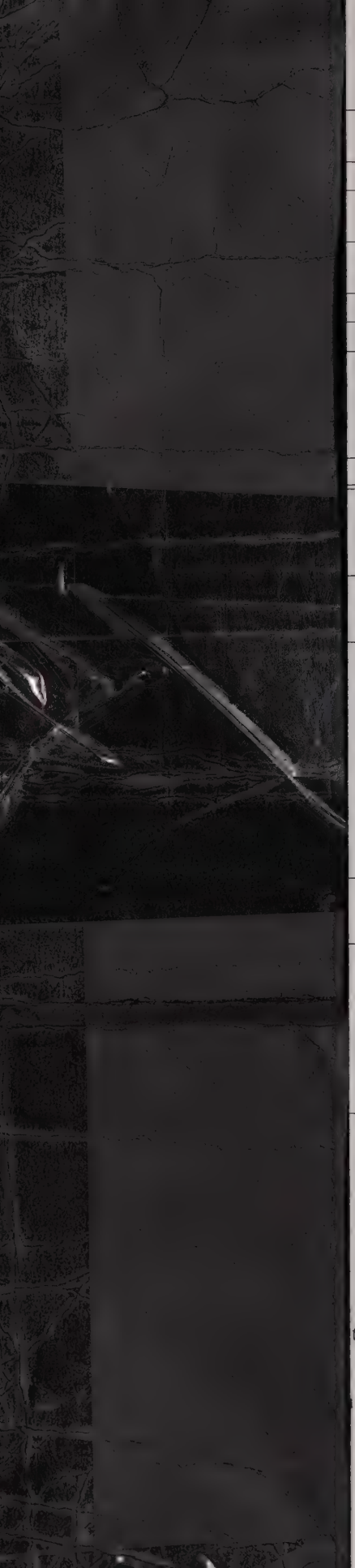
CE SIGNAL GENERATOR OUTPUT AS NEED TO KEEP TP1 READING BELOW 50 uA.
SIGNAL GENERATOR ON FREQUENCY USE THE ZERO BEAT METHOD IN STEP 3.

20 DB QUIETING SENSITIVITY MEASUREMENT

c vtvm across the speaker.
L model radio sets, disable the DPL or PL decoder by ungrounding the microphone hang-up but
ELCH control fully counterclockwise.
adio set and adjust the VOLUME control until a reading of 2 volts is obtained on the ac vtvm.
signal generator to the radio set antenna connector. Set the signal generator to the carrier frequ
nerator output level control to minimum.
se the output level of the rf signal generator until the ac vtvm reads 0.2 volts.
l generator output signal level. This signal level is the 20 dB quieting sensitivity of the receiver.







RECEIVER ALIGNMENT PROCEDURE AND TEST EQUIPMENT LIST

ton.

ency,

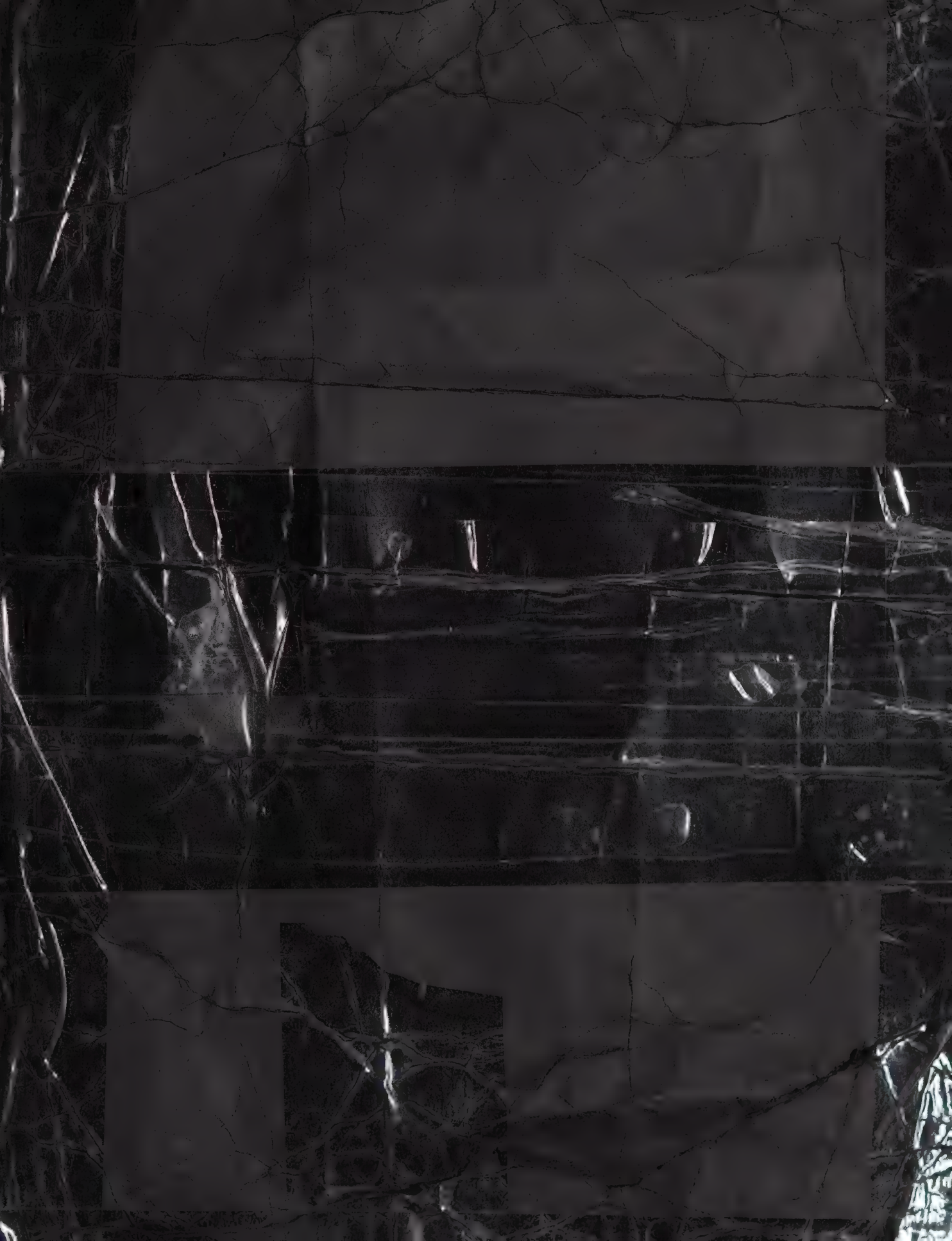
Motorola No. PEPS-24483-O
6/23/77- NPC

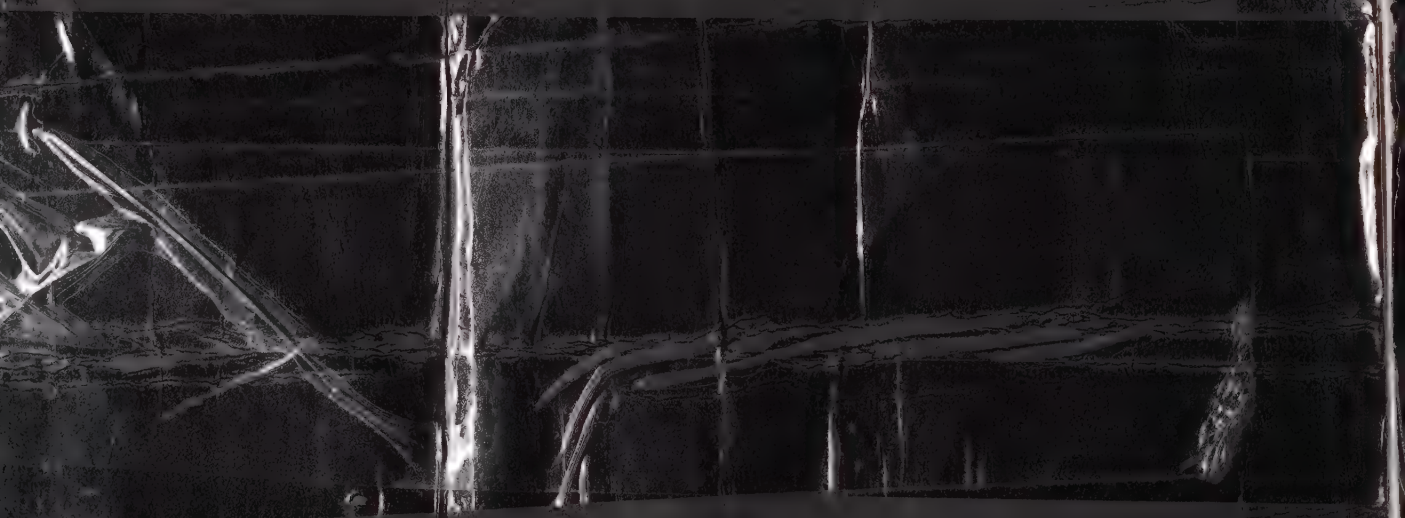
TRANSMITTER ALIGNMENT PROCEDURE

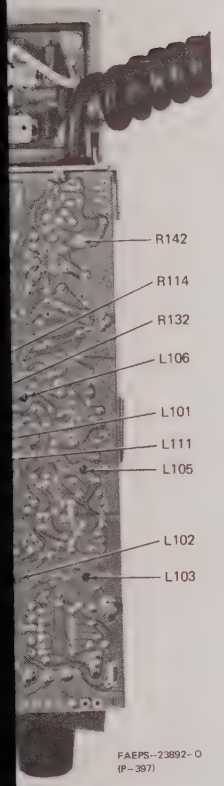
Transmitter Adjustment Lo

TRANSMITTER METER REA
20,000 OHM/VOLT VOL

METERING FUNCTION	VOLTMETER LEAD CONNECTIONS		
	+	−	
BUFFER AMPL. INPUT	TP3	CHASSIS GROUND	
CONTROLLED R.F. AMPL. COLLECTOR CURRENT	SW A+	TP5	
P.A. CURRENT	SW A+	TP7	







cations

DINGS, USING
TMETER

VOLTMETER SCALE	TYPICAL READINGS
0 uA, DC	3 uA (MIN.)
mA, DC	.32 mA (TYP.) .50 mA (MAX.)
500 mA, DC	290 mA (TYP.) 350 mA (MAX.)

PREALIGNMI

1. In some case
   is nearest top

2. Unnecessary
   Complete tra

   a. After cha

   b. After repl

3. Before begin

   a. Set C203
   b. Set L101

   c. Set L102,

   d. Set pow
   output.

4. Key transm
   unaligned

5. Two-frequ

6. Transmitte

$f_c = 2f_{osc}$
$f_c = 3f_{osc}$

Where f_c

ENT NOTES

s, peak readings may occur at two points in the tuning range of a coil. Always choose point where slug
of coil form (away from circuit board).

tuning adjustments should be avoided. Usually, only a "touch-up" transmitter alignment is needed.
nsmitter alignment is needed in the following cases:

nging transmitter operating frequency.

acing a component in a frequency-sensitive network.

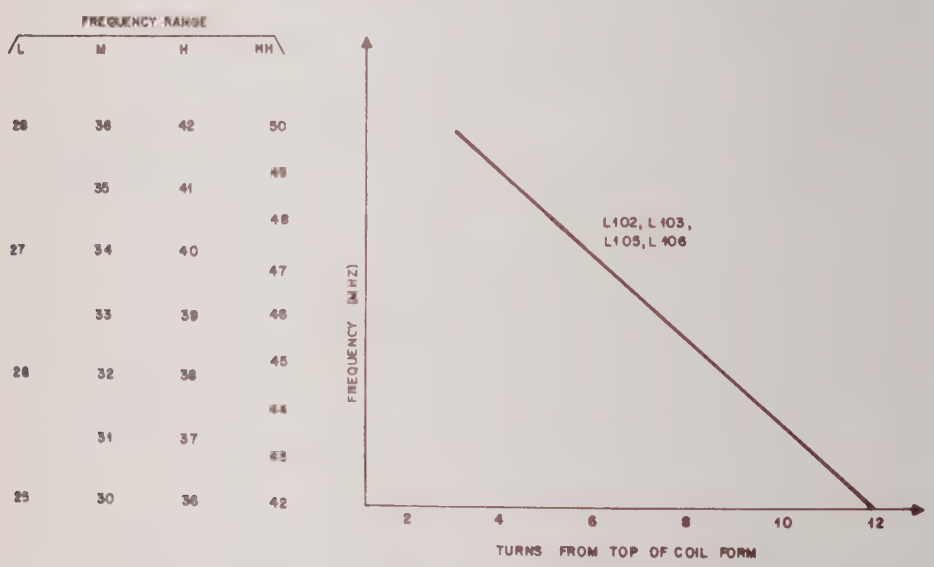
ning a complete alignment, preset tuning adjustments as follows:

and C207 1/4-turn counterclockwise from tight.
and L111 in 2-frequency models) 6 turns in from the end of the coil form away from the circuit board.

NOTE

Low or no TP3 reading will be obtained if L101 and L111 are not properly preset.

L103, L105, and L106 according to the following chart:



Transmitter Tuning Coil Preset BEPS-23893-A

er set control R142 fully counterclockwise (viewed from solder side of board) for maximum xmtr power

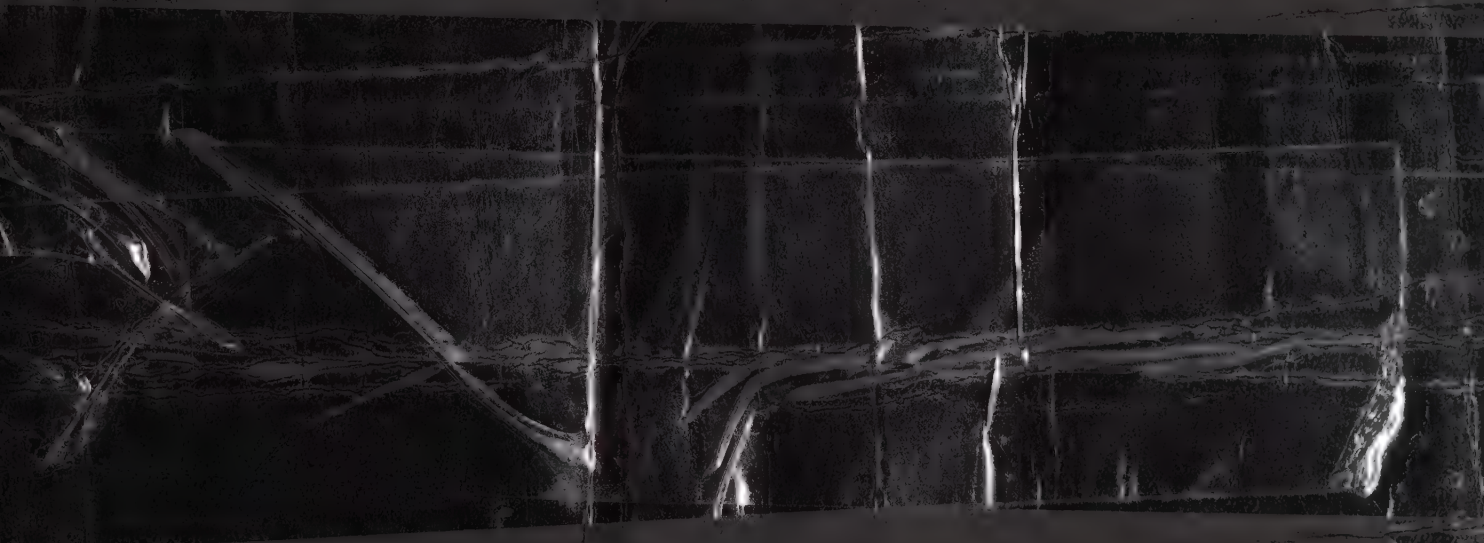
nitter for each step in alignment procedure and de-key after alignment step is completed. Avoid keying an transmitter for prolonged periods.

ency radios should be aligned on lowest operating frequency.

r frequency calculations:

Ranges (L) and (M)
Ranges (H) and (HH)

= carrier frequency, and f_{osc} = crystal oscillator frequency.



EQUIPMENT SET-UP

ering may be accomplished with a 20,000 ohm-per-volt voltmeter. Refer to the metering table on this page.
nect an rf wattmeter, terminated in a resonant antenna or 50-ohm resistive dummy load, to radio set antenna
ector J602.
nect a dc power supply to the power leads of the test cable. Set the power supply output to 13.8 volts.
orm the exciter alignment and power amp alignment steps shown below (all radio models).

NOTE
TWO-FREQUENCY RADIOS SHOULD BE TUNED ON LOWEST FREQUENCY.

EXCITER ALIGNMENT

STEP	ADJUST	METERING POINT	DESIRED READING
1 OSCILLATOR OUTPUT	L102, THEN L103	TP3	PEAK
2 BUFFER	L105	TP3	DIP IF NO TP5 READING
OUTPUT		TP5	PEAK
3 AMPLIFIER	L106	TP5	PEAK

POWER AMP ALIGNMENT

STEP	ADJUST	METERING POINT	DESIRED READING
1 PA INPUT	C203	RF OUTPUT	PEAK WATTMETER READING
2 PA OUTPUT	C207	RF OUTPUT	PEAK WATTMETER READING
3 AMPLIFIER	L106	RF OUTPUT OR TP5	PEAK WATTMETER READING OR PEAK TP5 READING
4 PA OUTPUT	C203 THEN C207	RF OUTPUT	PEAK WATTMETER READING
5 DRIVE REGULATOR	R142	RF OUTPUT AND TP7	28 WATTS, WITH TP7 LESS THAN 30 uA

mpletes the transmitter alginment procedure for one-frequency radios and for two-frequency radios with a t frequency spacing of less than 100 kHz. For two-frequency radios with a transmit frequency spacing of more 0 kHz but less than 400 kHz (L), 480 kHz (M), 580 kHz (H), or 680 kHz (HH), tune up the exciter and power r on the lowest transmit frequency as described above, leaving R142 set for maximum power output. Then to the wide-space tune-up procedure immediately following this paragraph. (Two-frequency radios with t frequency spacings in excess of the limits discussed above cannot be properly adjusted by the procedures d. See your Motorola representative for assistance.)

IDC ADJUSTMENT (CONT'D)

3. Disconnect the microphone white wire from pin **U** and connect the output of an audio signal generator as follows:

   - High side through a 1 uF capacitor (+ end toward the radio) to pin **U**.
   - Low side to radio chassis.

4. Connect an ac voltmeter across the audio signal generator output.

IDC ADJUSTMENT PROCEDURE:

STEP	PROCEDURE
1	Set audio signal generator output frequency to 1000 Hz and output level to 0.8 V.
2	Select F1 and key transmitter. Adjust F1 "IDC" control R114 for ±5 kHz deviation meter reading.
3	On 2-freq. models, select F2 and key transmitter. Adjust F2 "IDC" control R132 for ± 5 kHz deviation meter reading.
4	Reduce audio signal generator output level until deviation meter reads ±3.0 kHz. Audio oscillator output level should be 165 mV ±3 dB.
	"PRIVATE-LINE" MODELS ONLY
5A	Insert resonant reed into socket on PL board and disconnect audio oscillator from pin **U**.
6A	Key transmitter and adjust Tone Level control R433 for PL tone deviation reading of 800 Hz.
7A	Reconnect audio signal generator to pin **U** and repeat steps 1 through 3. Be sure overall deviation does not exceed ±5 kHz, including PL tone.
8A	Reconnect white wire from microphone to pin **U**.
	or
	"DIGITAL PRIVATE-LINE" MODELS ONLY (SEE NOTE)
5A	Remove the short from between the "code disable" plating pads on the DPL board and disconnect the audio signal generator from pin **U**.
6B	Key the transmitter and adjust Code Level set control R342 for a DPL code deviation reading of 750 Hz.
7B	Reconnect the audio signal generator to pin **U**. Repeat steps 5 and 6. Be sure overall deviation does not exceed ±5 kHz, including DPL code.
8B	Reconnect white wire from microphone to pin **U**

NOTE

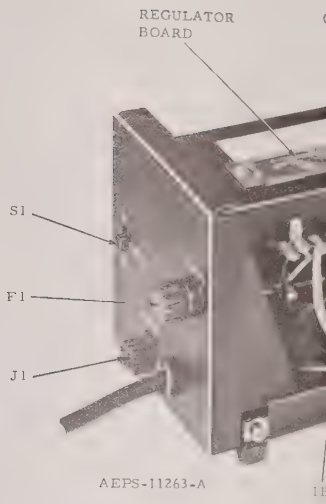
To obtain accurate measurement of transmitter deviation in radios equipped with "Digital Private-Line" binary-coded squelch, the frequency response of the deviation measuring equipment must extend to below 1 Hz. If a deviation meter with this low frequency response characteristic is not available, the transmitter deviation can be checked by making the transmitter send continuous sinewave during the measurement. Standard test equipment will then provide an accurate deviation measurement. To make the transmitter send continuous sinewave, short together the base and emitter plating of PTT inverter Q309, cut the jumper between C322 and ground, and key the transmitter. When the IDC alignment is completed, replace the jumper between C322 and ground.

REFERENCE SYMBOL	PART NO.	DESCRIPTION

PARTS LIST

TLN5274A Regulator Board — PL-2257-B

		CAPACITOR, fixed: uF;
C1	8-82905G02	.022 ±10%; 50 V
C2	23-83210A08	100 +150-10%; 25 V
C3, 4	8-82905G02	.022 ±10%; 50 V
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR5	48-82392B03	silicon
		TRANSISTOR: (SEE NOTE)
Q1, 2	48-869170	NPN; type M9170
		RESISTOR, fixed: ±5%; 1/2 W: unless otherwise stated
R1	6-400812	470
R2	6-400459	1.5k
R3	6-400422	33
R4	17-82177B40	200; 5 W
R5, 6	6-5593	470 ±10%; 1 W
R7, 8	6-6411	1k
R9, 10	6-6320	10k ±10% (NOTE: Use is optional; determined at factory)
R11	6-6393	1.2k ±10%
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
VR1	48-83696E01	silicon; Zener type; 6.8 V ±5%

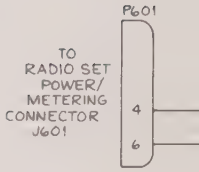


C

TRN6282A Power Supply Chassis — PL-3349-B

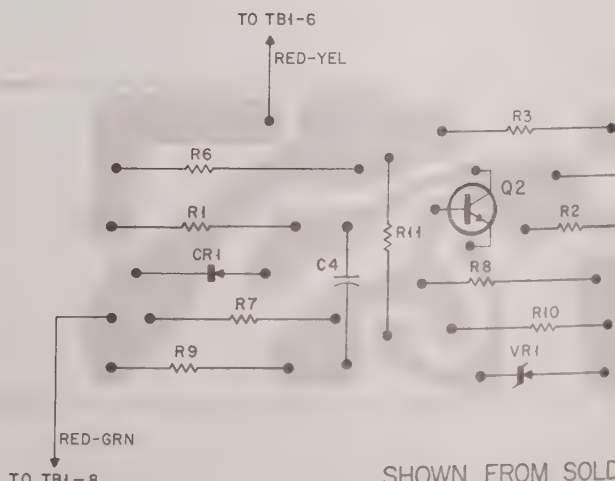
C1	23-82464C08	CAPACITOR, fixed: 11,000 uF +75-10%; 35 V
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR1, 2	48-82732C07	silicon
CR3, 4	48-82732C10	silicon
J1		CONNECTOR, receptacle: includes: 15-10183A52 INSULATOR, 6-contact 29-82335A01 CONTACT, male; 4 req'd. (P/O Model TLN5219A)
F1	65-804908	FUSE, cartridge: slow-blow type; 2 A
P1	30-83212F01	LINE CORD: includes: ac plug
Q3	48-869677	TRANSISTOR: (SEE NOTE) PNP; type M9677
Q4, 5	48-869244	NPN; type M9244
S1	40-84622B02	SWITCH, slide: DPST
T1	25-83594E02	TRANSFORMER, power: pri: res 2.75 Ohms sec: res 0.11 Ohm
TB1	31-121700	TERMINAL STRIP: 8 terminals; No. 2 & 7 mtg.
XF1	9-82083C01	FUSEHOLDER: extractor post type
NON-REFERENCED ITEMS		
	26-84923B03	HEATSINK
	1-80745B88	HOUSING, power supply

NOTE: Replacement diodes and transistors must be ordered by listed part number only for optimum performance.

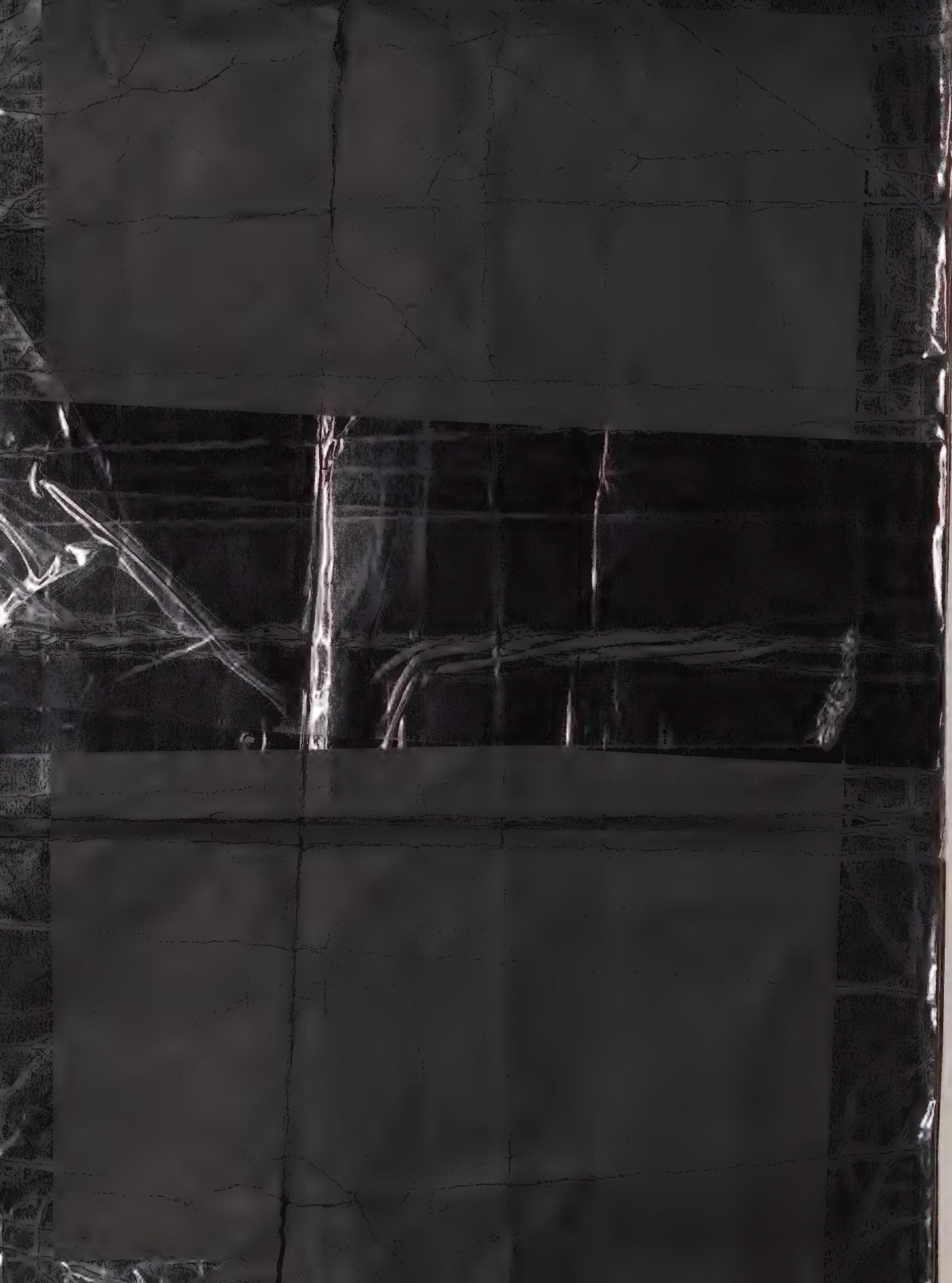


MODEL TABLE

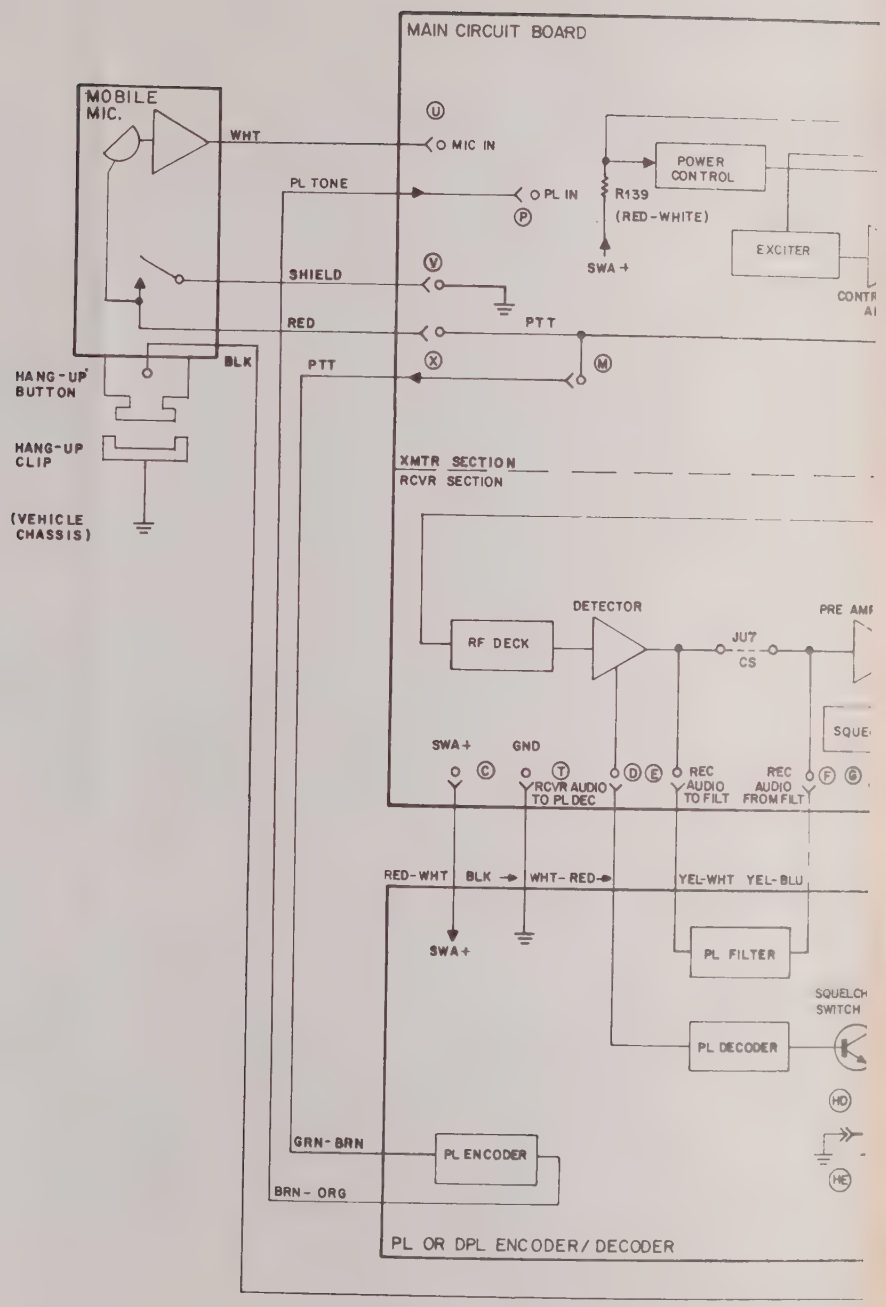
MODEL	SUB-M
TPN1136A	TLN527
	TRN628
	TLN527



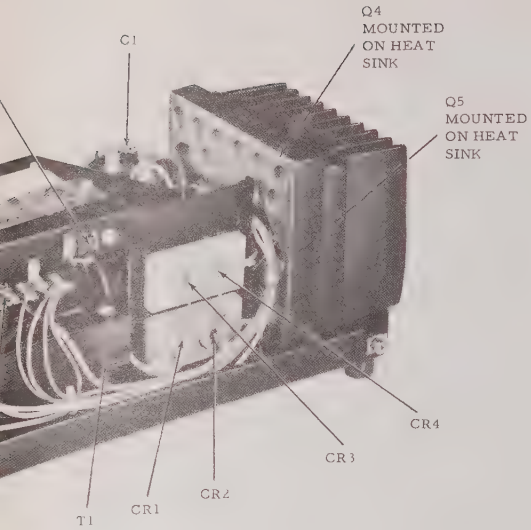
SHOWN FROM SOLD



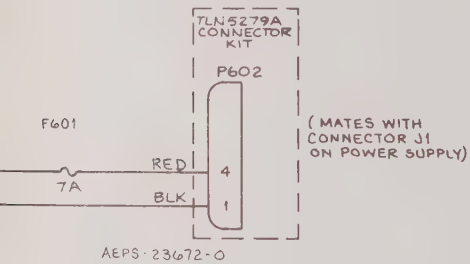
Radio
Functi
Motore
6/27/7



Radio Set
Functional Interconnect Diagram
Motorola No. DEPS-24473-O
6/27/77- NPC

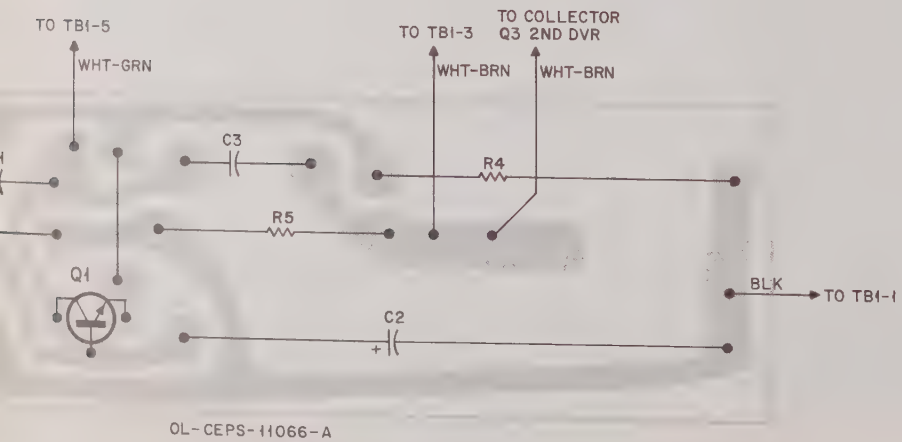


ABLE DETAIL



ODEL	VERSION	DESCRIPTION
1A	O	REGULATOR BOARD
2A	O	POWER SUPPLY CHASSIS
0A	O	CONNECTOR KIT

EPS–17211–B



OL-CEPS-11066-A

ER SIDE

TO OPTIONAL
REMOTE
ON-OFF SW

+14.

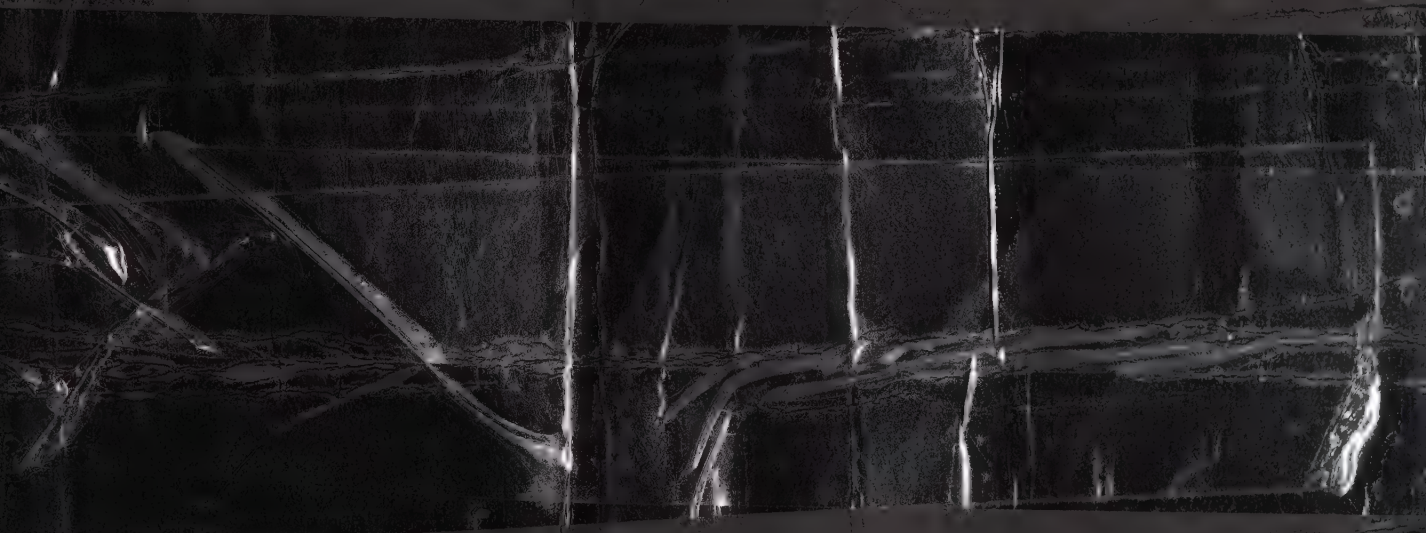
GROU

TRANSI
Q1, Q2
C
E
B

Q4, Q5
C
B
E

NOTES:
1. UNLESS O
RESISTOR
2. CHASSIS
TLN5238
3. R9 AND R
FACTORY.

FLOATING
GROUND

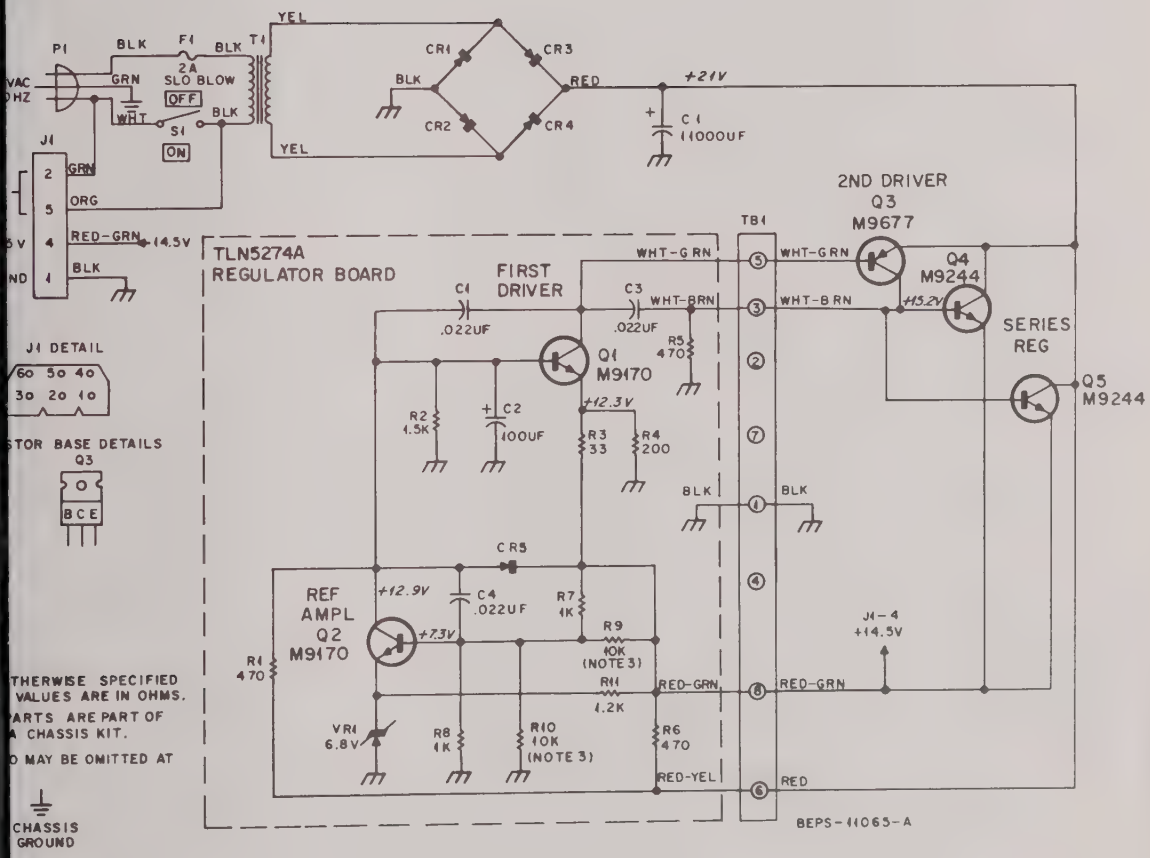


FIXED STATION POWER SUPPLY

MODEL TPN1136A

FUNCTION

Provides the entire radio with regulated +14.5 V DC when used in a 120 V AC primary power fixed installation.



BASE STATION POWER SUPPLY/
RADIO CIRCUIT BOARD DETAIL

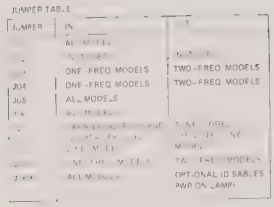
68P81029E96-B
4/27/77-NPC

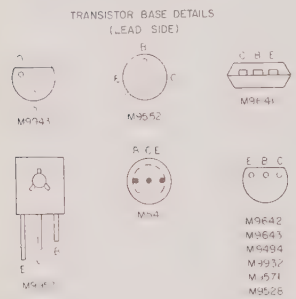
UNIFIED CHASSIS

CIRCUIT BOARD DETAIL

68P81036E43-O
(Sheet 1 of 4)
6/27/77-NPC

SHOWN FROM SOLDER SIDE

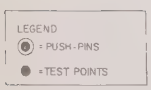




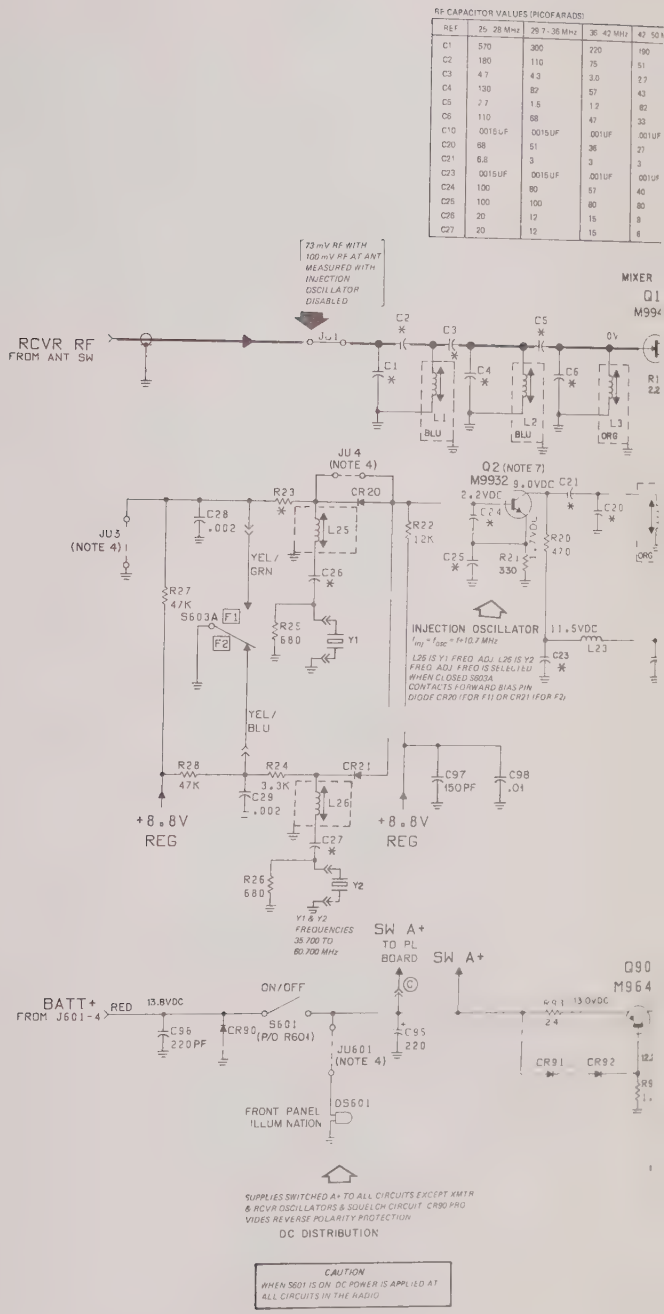
SINGLE FREQUENCY STRAPPING TABLE

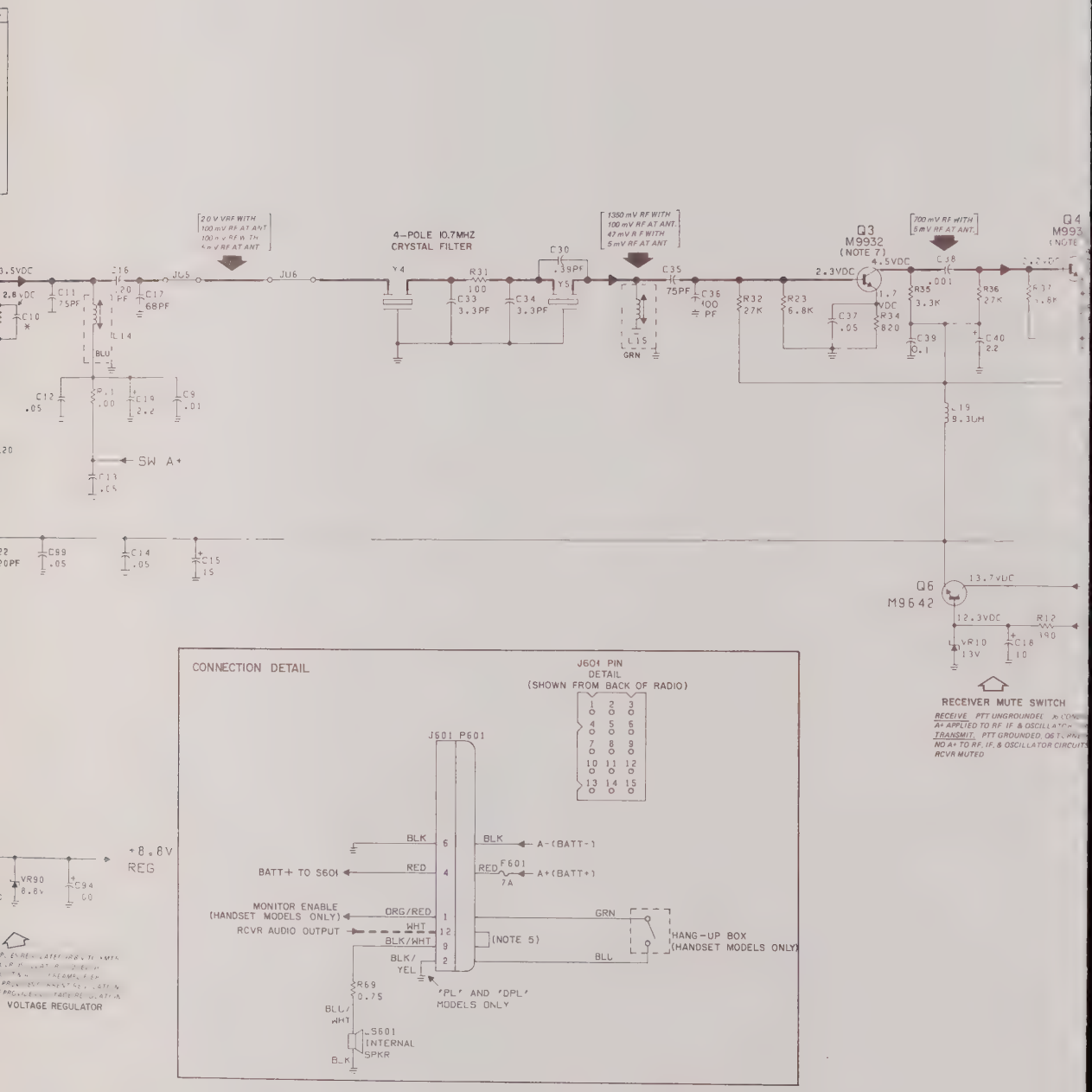
FUNCTION	WIRE COLOR	CONNECTED TO
RECEIVE* F1 = F2	YEL-BLU RCVR F2 SEL	HOLE "H" RCVR F1 PAD
TRANSMIT** F1 = F2	F2 YEL-RED XMTR F2 SEL	HOLE "Y" XMTR F1 PAD

*RCVR XTAL MUST BE IN F1 SOCKET
**XMTR XTAL MUST BE IN F1 SOCKET

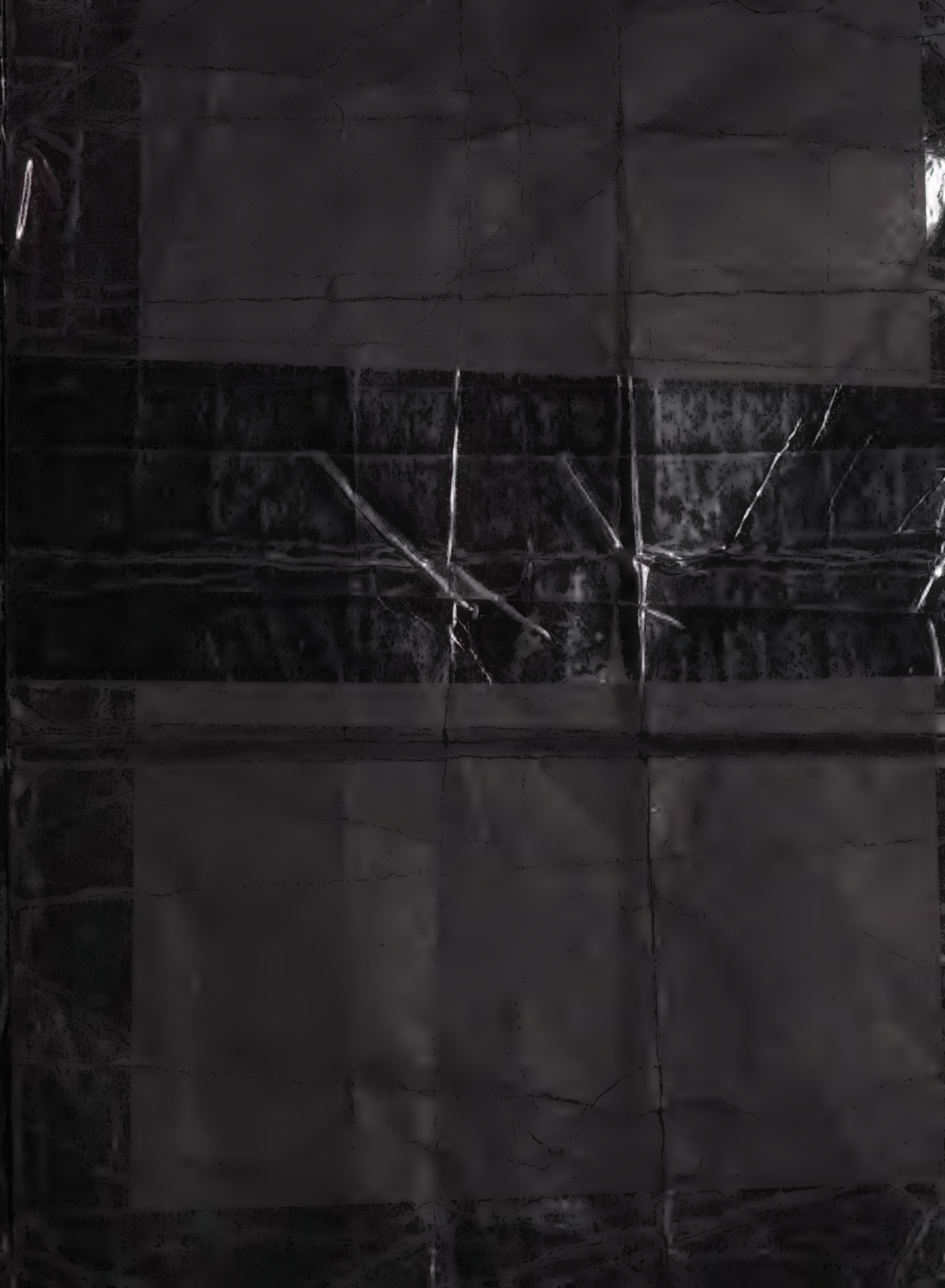


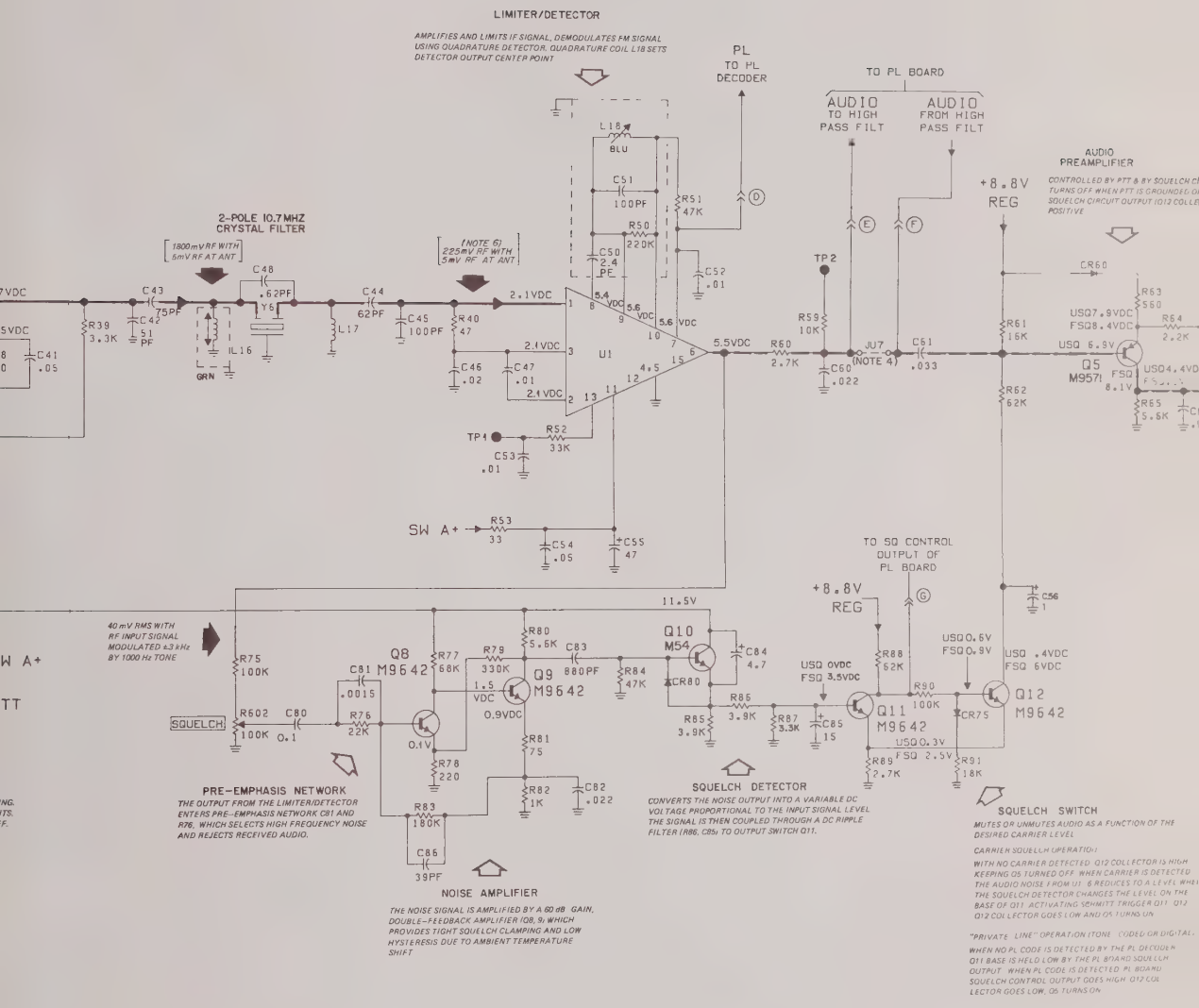
COMPONENT SIDE BD-EEPS-23897-0
SOLDER SIDE @ BD-EEPS-23896-0
OL-EEPS-24393-0

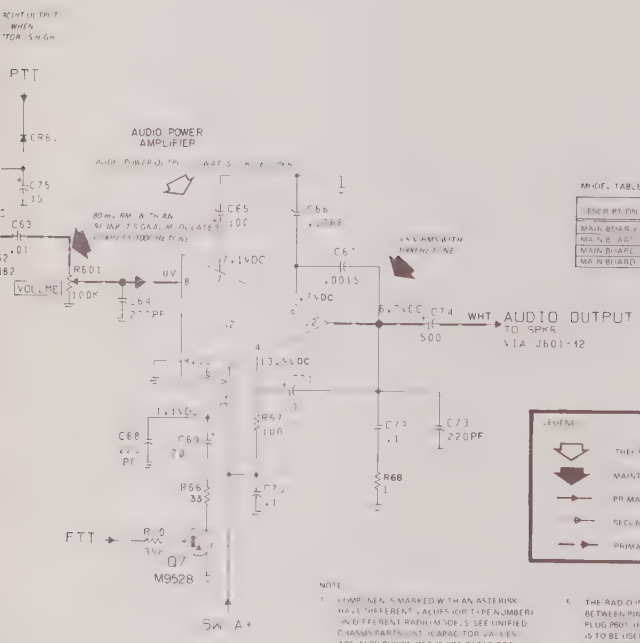

RF CAPACITOR VALUES (PICOFARADS)
REF
25-28 MHz
29.7-36 MHz
36-42 MHz
73 mV RF WITH 100 mV RF AT ANT MEASURED WITH INJECTION OSCILLATOR DISABLED
MIXER Q1 M994
RCVR RF FROM ANT SW
J4-1
C1
C2
C3
C4
C5
C6
L1
L2
L3
BLU
ORG
JU4 (NOTE 4)
JU3 (NOTE 4)
Q2 (NOTE 7) M9932
9.0VDC
2.2VDC
C21
C24
C20
C28 .002
R23
CR20
L25
R22 12K
R20 470
C25
R21 330
YEL/GRN
C26
R27 47K
S603A
F1
F2
R25 680
Y1
INJECTION OSCILLATOR
11.5VDC
L23
C23
L26 IS Y1 FREQ. ADJ. L26 IS Y2 FREQ. ADJ. FREQ IS SELECTED WHEN CLOSED S603A CONTACTS FORWARD BIAS PIN DIODE CR20 (FOR F1) OR CR21 (FOR F2).
YEL/BLU
R28 47K
R24 3.3K
CR21
C29 .002
C27
C97 150PF
C98 .01
+8.8V REG
+8.8V REG
R26 680
Y2
Y1 & Y2 FREQUENCIES 35.700 TO 60.700 MHz
SW A+ TO PL BOARD
SW A+
Q90 M964
BATT+ FROM J601-4
RED
13.8VDC
ON/OFF
S601 (P/O R604)
C96 220PF
CR90
C95 220
JU601 (NOTE 4)
CR91
CR92
DS601
FRONT PANEL ILLUMINATION
SUPPLIES SWITCHED A+ TO ALL CIRCUITS EXCEPT XMTR & RCVR OSCILLATORS & SQUELCH CIRCUIT. CR90 PROVIDES REVERSE POLARITY PROTECTION.
DC DISTRIBUTION
CAUTION
WHEN S601 IS ON, DC POWER IS APPLIED AT ALL CIRCUITS IN THE RADIO.



4-POLE 10.7MHZ
CRYSTAL FILTER
Q3
M9932
(NOTE 7)
Q4
M993
Q6
M9642
SW A+
RECEIVER MUTE SWITCH
CONNECTION DETAIL
J601 PIN
DETAIL
(SHOWN FROM BACK OF RADIO)
J601 P601
BATT+ TO S601
MONITOR ENABLE
(HANDSET MODELS ONLY)
RCVR AUDIO OUTPUT
A-(BATT-)
A+(BATT+)
F601
7A
(NOTE 5)
HANG-UP BOX
(HANDSET MODELS ONLY)
'PL' AND 'DPL'
MODELS ONLY
S601
INTERNAL
SPKR
+8.8V
REG
VOLTAGE REGULATOR




LIMITER/DETECTOR
AMPLIFIES AND LIMITS IF SIGNAL, DEMODULATES FM SIGNAL USING QUADRATURE DETECTOR. QUADRATURE COIL L18 SETS DETECTOR OUTPUT CENTER POINT
PL TO PL DECODER
TO PL BOARD
AUDIO TO HIGH PASS FILT
AUDIO FROM HIGH PASS FILT
AUDIO PREAMPLIFIER
+8.8V REG
2-POLE 10.7 MHZ CRYSTAL FILTER
1800 mV RF WITH 5mV RF AT ANT
(NOTE 6) 225 mV RF WITH 5 mV RF AT ANT
L18 BLU
C51 100PF
R51 47K
R50 220K
C50 2.4 PF
C52 .01
TP2
R59 10K
JU7 (NOTE 4)
C61 .033
C60 .022
R61 16K
R62 62K
CR60
R63 560
R64 2.2K
USQ 7.9VDC FSQ 8.4VDC
USQ 6.9V
Q5 M9571
USQ 4.4V FSQ 8.1V
R65 5.6K
C43 75PF
C42 51 PF
C48 .62PF
Y6
L17
C44 62PF
C45 100PF
R40 47
C46 .02
C47 .01
IL16
GRN
R39 3.3K
C41 .05
2.1VDC
5.4 VDC
5.6 VDC
5.5VDC
U1
R60 2.7K
TP1
R52 33K
C53 .01
SW A+
R53 33
C54 .05
C55 47
TO SQ CONTROL OUTPUT OF PL BOARD
C56
11.5V
40 mV RMS WITH RF INPUT SIGNAL MODULATED ±3 kHz BY 1000 Hz TONE
R75 100K
SQUELCH
R602 100K
C80 0.1
R76 22K
C81 .0015
Q8 M9642
R77 68K
R78 330K
1.5 VDC
Q9 M9642
0.9VDC
R80 5.6K
C83 880PF
R84 47K
R81 75
R82 1K
C82 .022
R78 220
R83 180K
C86 39PF
0.1V
Q10 M54
C84 4.7
CR80
R85 3.9K
R86 3.9K
R87 3.3K
C85 15
USQ 0VDC FSQ 3.5VDC
Q11 M9642
R88 62K
R90 100K
USQ 0.6V FSQ 0.9V
USQ 0.3V FSQ 2.5V
R89 2.7K
R91 18K
CR75
Q12 M9642
USQ .4VDC FSQ 6VDC
PRE-EMPHASIS NETWORK
THE OUTPUT FROM THE LIMITER/DETECTOR ENTERS PRE-EMPHASIS NETWORK C81 AND R76, WHICH SELECTS HIGH FREQUENCY NOISE AND REJECTS RECEIVED AUDIO.
NOISE AMPLIFIER
THE NOISE SIGNAL IS AMPLIFIED BY A 60 dB GAIN, DOUBLE-FEEDBACK AMPLIFIER (Q8, 9) WHICH PROVIDES TIGHT SQUELCH CLAMPING AND LOW HYSTERESIS DUE TO AMBIENT TEMPERATURE SHIFT
SQUELCH DETECTOR
CONVERTS THE NOISE OUTPUT INTO A VARIABLE DC VOLTAGE PROPORTIONAL TO THE INPUT SIGNAL LEVEL. THE SIGNAL IS THEN COUPLED THROUGH A DC RIPPLE FILTER (R86, C85) TO OUTPUT SWITCH Q11.
SQUELCH SWITCH
MUTES OR UNMUTES AUDIO AS A FUNCTION OF THE DESIRED CARRIER LEVEL
CARRIER SQUELCH OPERATION:
WITH NO CARRIER DETECTED Q12 COLLECTOR IS HIGH, KEEPING Q5 TURNED OFF. WHEN CARRIER IS DETECTED, THE AUDIO NOISE FROM U1 6 REDUCES TO A LEVEL WHERE THE SQUELCH DETECTOR CHANGES THE LEVEL ON THE BASE OF Q11, ACTIVATING SCHMITT TRIGGER Q11, Q12. Q12 COLLECTOR GOES LOW AND Q5 TURNS ON.
"PRIVATE LINE" OPERATION (TONE CODED OR DIGITAL):
WHEN NO PL CODE IS DETECTED BY THE PL DECODER, Q11 BASE IS HELD LOW BY THE PL BOARD SQUELCH OUTPUT. WHEN PL CODE IS DETECTED, PL BOARD SQUELCH CONTROL OUTPUT GOES HIGH, Q12 COLLECTOR GOES LOW, Q5 TURNS ON.



MODEL TABLE

DESCRIPTION	FREQ		FREQ	
	MODEL	VERSION	MODEL	VERSION
MAIN BOARD [illegible]	TLB8[illegible]1A	[illegible]	TLB8[illegible]1A	
MAIN BOARD [illegible]	TLB8[illegible]	[illegible]	TLB8[illegible]2A	
MAIN BOARD [illegible] MHz	TLB8363A	[illegible]	TLB8[illegible]3A	[illegible]
MAIN BOARD [illegible] MHz	TLB8364A	C	TLB8[illegible]4A	[illegible]

LEGEND

- THEORY OF OPERATION DATA
- MAINTENANCE DATA
- PRIMARY RF SIGNAL FLOW
- SECONDARY RF SIGNAL FLOW
- PRIMARY AUDIO SIGNAL FLOW

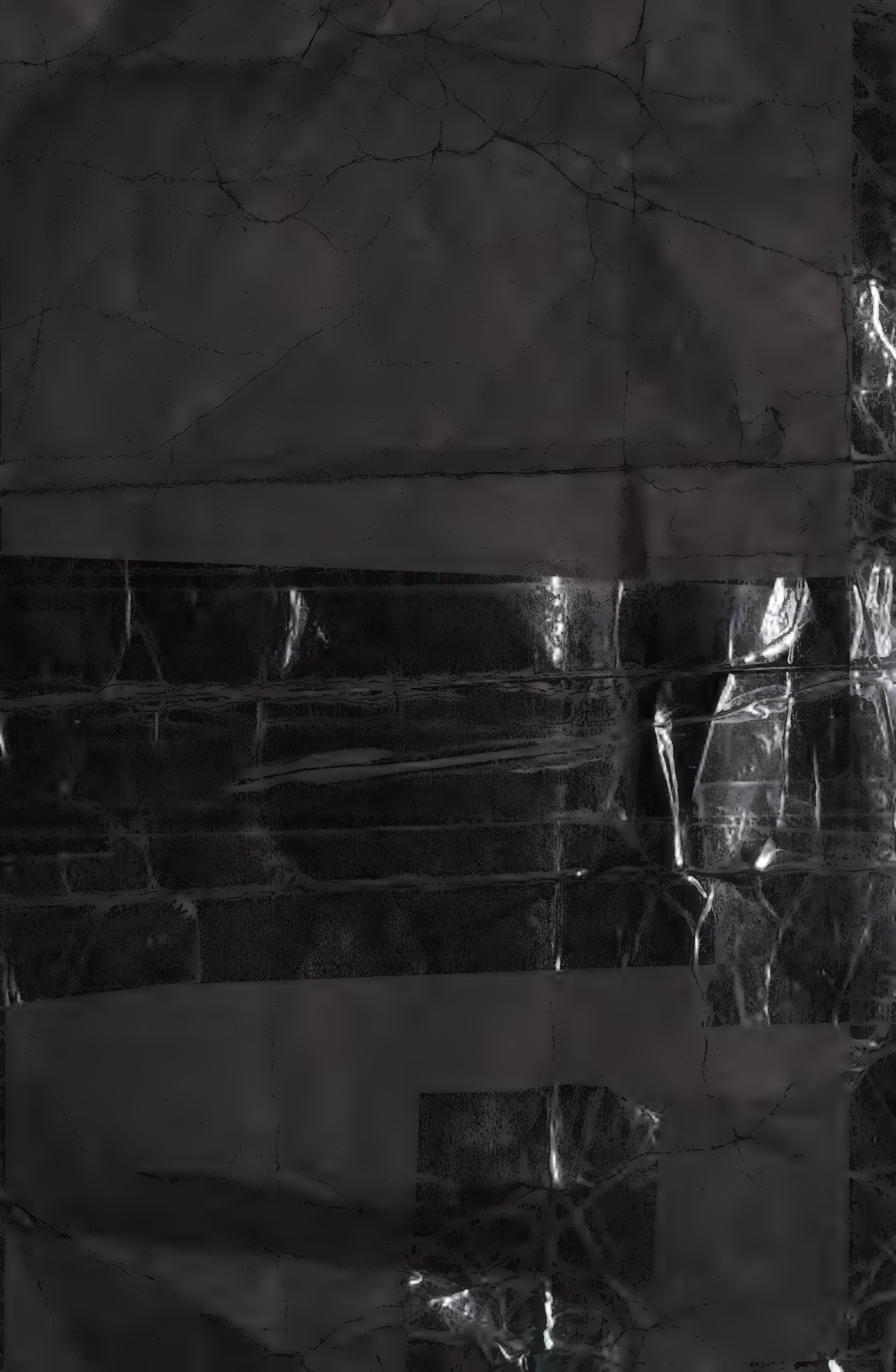
NOTE

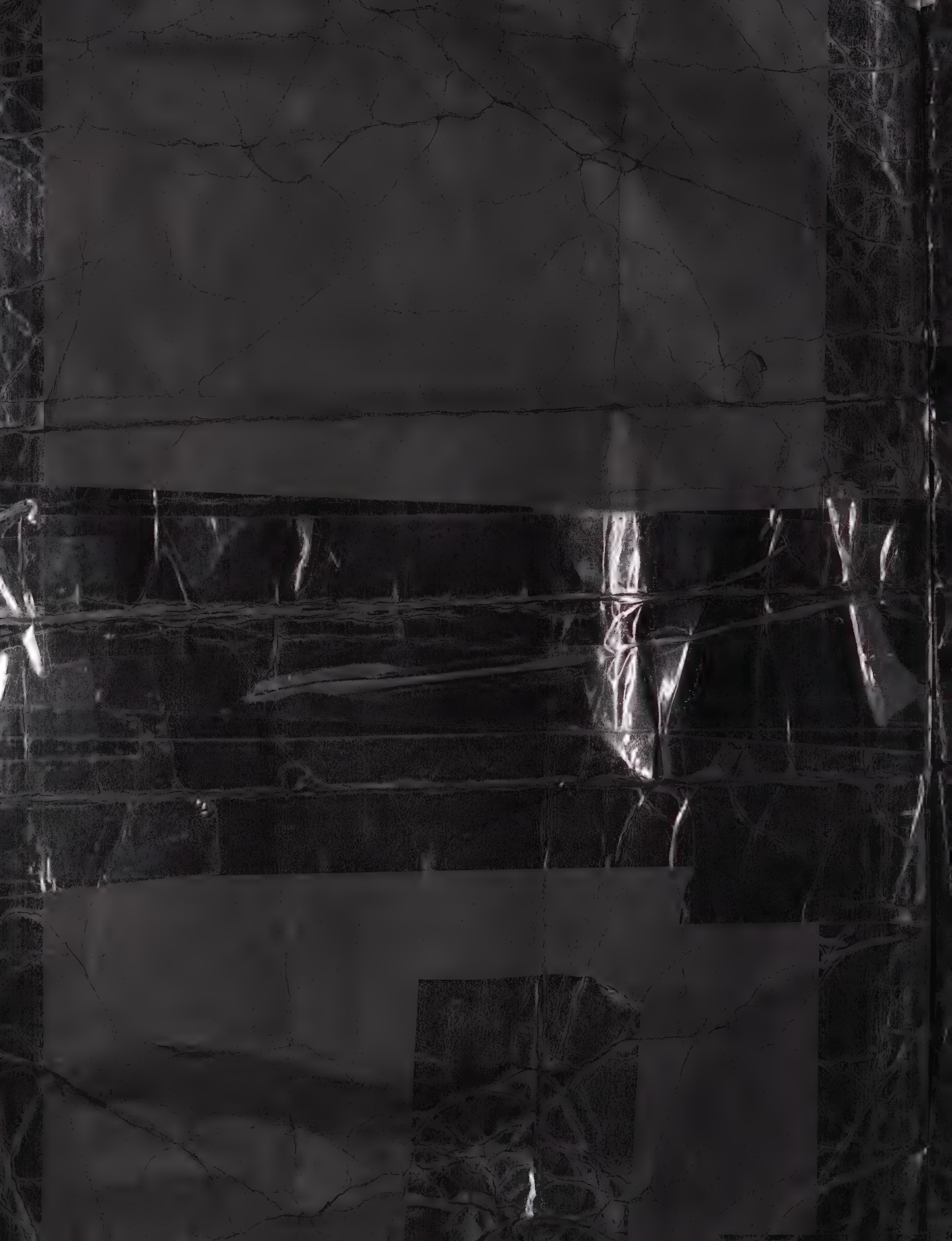
1. COMPONENTS MARKED WITH AN ASTERISK HAVE DIFFERENT VALUES (OR TYPE NUMBER) ON DIFFERENT RADIO MODELS. SEE UNIFIED CHASSIS PARTS LIST. CAPACITOR VALUES ARE ALSO SHOWN IN THE "RF CAPACITOR VALUES" TABLE ABOVE Q11.
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES ARE IN MICROFARADS.
3. UNLESS OTHERWISE NOTED DC VOLTAGES ARE MEASURED WITH A 20,000 OHM PER VOLTMETER AND RF VOLTAGES ARE MEASURED WITH AN RF VOLTMETER. Q2 VOLTAGES MEASURED WITH VOLUME CONTROL FULLY COUNTERCLOCKWISE (MINIMUM VOLTAGE).
   - 5 RCVR SQUELCHED
   - 6 RCVR UNSQUELCHED
4. JUMPER CONNECTIONS ARE SHOWN IN THE FOLLOWING TABLE

JUMPER	IN	OUT
JU1	ALL MODELS	
JU2	NOT USED	NOT USED
JU3	ONE FREQ MODELS	TWO FREQ MODELS
JU4	ONE FREQ MODELS	TWO FREQ MODELS
JU5	ALL MODELS	
JU6	ALL MODELS	
JU7	CARRIER SQUELCH & DIGITAL PRIVATE LINE MODELS	TONE CODED PRIVATE LINE MODELS
JU101	ONE FREQ MODELS	TWO FREQ MODELS
JU601	ALL MODELS	OPTIONAL (DISABLES PWR ON LAMP)

5. THE RADIO IS SUPPLIED WITH A JUMPER BETWEEN PINS 3 AND 12 OF ACCESSORY PLUG P601. IF AN EXTERNAL SPEAKER IS TO BE USED REMOVE THIS JUMPER AND CONNECT THE EXTERNAL SPEAKER TO PINS 9 AND 12 OF P601.
6. WHEN MEASURING PIN 1 OF REDUCE THE RF LEVEL AT THE ANTENNA TILL PIN 1 LEVEL PEAKS OUT. THE PIN 1 LEVEL SHOULD BE APPROXIMATELY 300 mV WITH 1.2 mV RF AT THE ANTENNA.
7. TRANSISTORS Q2, Q3 AND Q4 MAY BE TYPE M9494.

EEPS-24390-0





UNIFIED CHASSIS RECEIVER SECTION

FUNCTION

Amplifies, mixes, filters, and demodulates received rf energy from antenna (via antenna switch) and provides an amplified audio signal to the speaker.

RADIO SET PARTS LISTS

UNIFIED CHASSIS

MODELS

TUB1461AB (25-28 MHz)
TUB1462AB (29.7-36 MHz)
TUB1463AB (36-42 MHz)
TUB1464AB (42-50 MHz)
} 1 freq.

TUB1461AH (25-28 MHz)
TUB1462AH (29.7-36 MHz)
TUB1463AH (36-42 MHz)
TUB1464AH (42-50 MHz)
} 2 freq.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

LEGEND

L = 25-28 MHz models only
M = 29.7-36 MHz models only
H = 36-42 MHz models only
HH = 42-50 MHz models only

Receiver components are numbered 1-99
Exciter components are numbered 100-199
Power Amplifier components are numbered 200-299
Other components are numbered 600-699

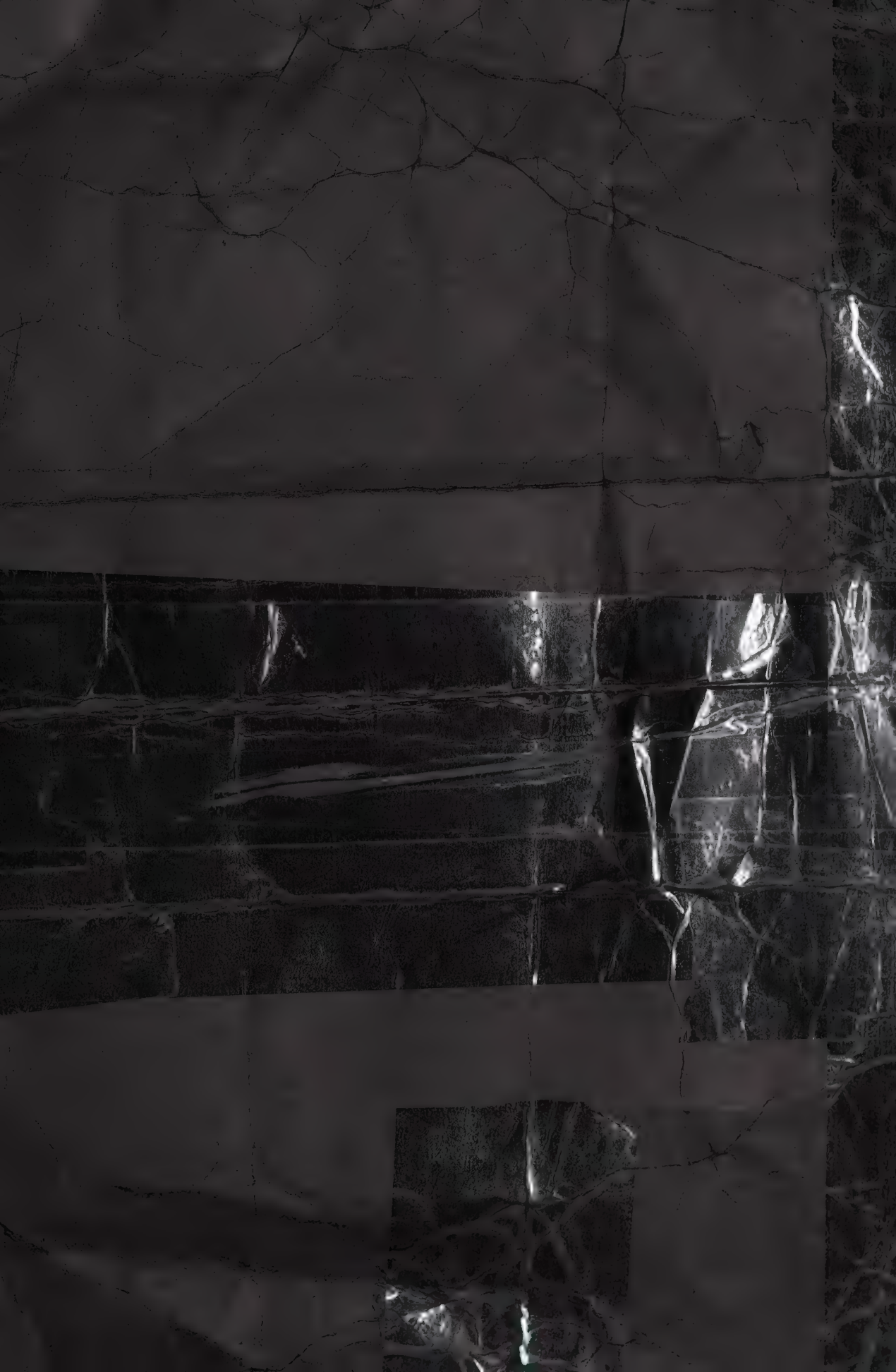
not shown in this parts list: see Power Amplifier section.

Unified Chassis PL-5591-O

		CAPACITOR, fixed: ±5%; 500 V; unless otherwise stated
C1L	21-84857K15	570 pF; 100 V
C1M	21-84494B15	300 pF; 100 V
C1H	21-84494B12	220 pF
C1HH	21-84494B10	190 pF
C2L	21-84857K32	180 pF; 100 V
C2M	21-84494B53	110 pF
C2H	21-82204B64	75 pF; N080
C2HH	21-82204B61	51 pF; N080
C3L	21-82450B12	4.7 pF
C3M	21-82450B10	4.3 pF
C3H	21-82450B11	3.0 pF
C3HH	21-82450B17	2.2 pF
C4L	21-84494B26	130 pF
C4M	21-82204B65	82 pF ±2%; N080
C4H	21-82204B62	57 pF; N080
C4HH	21-82204B28	43 pF; N080
C5L	21-82450B32	2.7 pF
C5M	21-82450B13	1.5 pF
C5H	21-82450B08	1.2 pF
C5HH	21-82450B44	.82 pF
C6L	21-84494B53	110 pF
C6M	21-82204B63	68 pF ±2%; N080
C6H	21-82204B60	47 pF; N080
C6HH	21-82204B59	33 pF; N080
C9	21-847064	.01 uF ±10%
C10L	21-82187B18	.0015 uF ±10%; 100 V
C10M	21-82187B18	.0015 uF ±10%; 100 V
C10H	21-82187B20	.001 uF ±10%; 100 V
C10HH	21-82187B20	.001 uF ±10%; 100 V
C11	21-82204B64	75 pF; N080
C12	21-82372C04	.05 uF +80-20%; 25 V
C13	21-82372C04	.05 uF +80-20%; 25 V
C14	21-82372C04	.05 uF +80-20%; 25 V
C15	23-84538C04	15 uF ±20%; 15 V
C16	21-82610C09	120 pF 100 V; N220
C17	21-84493B25	68 pF, 100 V; N220
C18	23-84615F01	10 uF +100-10%; 25 V
C19	23-84538C08	2.2 uF ±20%; 20 V
C20L	21-82204B63	68 pF ±2%; N080
C20M	21-82204B61	51 pF; N080
C20H	21-82133C54	30 pF; N080
C20HH	21-82133C50	27 pF; N075
C21L	21-83406D16	1.8 pF ±.25; NP0
C21M	21-82133C45	5 pF ±.5; NP0
C21H	21-82133C43	3 pF ±.5; NP0
C21HH	21-82133C43	3 pF ±.5; NP0

68P81036E43-O
(Sheet 3 of 4)
6/27/77-NPC

REFERENCE SYMBOL	MO PA
C22	21
C23L	21
C23M	21
C23H	21
C23HH	21
C24L	21
C24M	21
C24H	21
C24HH	21
C25L	21
C25M	21
C25H	21
C25HH	21
C26L	21
C26M	21
C26H	21
C26HH	21
C27L	21
C27M	21
C27H	21
C27HH	21
C28	21
C29	21
C30	21
C33	21
C34	21
C35	21
C36	21
C37	21
C38	21
C39	21
C40	23
C41	21
C42	21
C43	21
C44	21
C45	21
C46	21
C47	21
C48	21
C50	21
C51	21
C52	21
C53	21
C54	21
C55	23
C56	23
C60	8-
C61	8-
C62	8-
C63	8-
C64	21
C65	23
C66	8-
C67	21
C68	21
C69	23
C70	21
C71	23
C72	8-
C73	21
C74	23
C75	23
C80	8-
C81	21
C82	8-
C83	21
C84	23
C85	23
C86	21
C94	23
C95	23
C96	23
C97	21
C98	21
C99	21
C101	21
C102	8-
C103	8-
C104	21



TOROLA ART NO.	DESCRIPTION
-83596E10	220 pF ±20%
-82187B18	.0015 uF ±10%; 100 V
-82187B18	.0015 uF ±10%; 100 V
-82187B20	.001 uF ±10%; 100 V
-82187B20	.001 uF ±10%; 100 V
-82610C44	100 pF; 100 V; N220
-82610C68	80 pF; 200 V; N150
-82610C47	57 pF; 100 V; N220
-82610C46	40 pF; 100 V; N220
-82610C44	100 pF; 100 V; N220
-82610C44	100 pF; 100 V; N220
-82610C68	80 pF; 200 V; N150
-82610C68	80 pF; 200 V; N150
-82133G08	20 pF; N750
-82133G15	12 pF; N470
-82204B53	15 pF; N750
-84493B43	8 pF; N470
-82133G08	20 pF; N750
-82133G15	12 pF; N470
-82204B53	15 pF; N750
-84493B43	8 pF; N470
-82187B27	.002 uF ±10%; 100 V
-82187B27	.002 uF ±10%; 100 V
-82450B07	.39 pF
-82450B15	3.3 pF
-82450B15	3.3 pF
-82204B64	75 pF 100 V; N080
-84493B33	100 pF; 200 V; N220
-82372C04	.05 uF +80-20%; 25 V
-82187B20	.001 uF ±10%; 100 V
-82372C01	.1 uF +80-20%; 25 V
-84538G08	2.2 uF ±20%; 35 V
-82372C04	.05 uF +80-20%; 25 V
-82610C29	51 pF; 200 V; N150
-82204B64	75 pF; N080
-82204B51	62 pF; N330
-82610C44	100 pF; 100 V; N220
-82428B26	.02 uF +80-20%; 200 V
-82428B59	.01 uF +80-20%; 200 V
-82450B16	.62 pF
-82450B14	2.4 pF
-82358G12	100 pF ±10%; N80
-82428B59	.01 uF +80-20%; 200 V
-82428B59	.01 uF +80-20%; 200 V
-82372C04	.05 uF +80-20%; 25 V
-84538G06	47 uF ±20%; 20 V
-84538G01	1 uF ±20%; 20 V
84496D07	.022 uF ±10%; 100 V
84496D11	.033 uF ±10%; 100 V
82905G45	.082 uF ±10%; 50 V
84496D03	.01 uF ±10%; 250 V
-83596E10	220 pF ±20%
-84669A19	100 uF +150-10%; 20 V
84496D08	.0068 uF ±10%; 400 V
-82187B18	.0015 uF ±10%; 100 V
-83596E10	220 pF ±20%
-84669A03	20 uF +100-0%; 15 V
-82372C01	.1 uF +80-20%; 25 V
-84669A19	100 uF +150-10%; 20 V
84496D05	.1 uF ±20%; 100 V
-83596E10	220 pF ±20%
-83210A19	500 uF ±10%; 20 V
-84665F02	15 uF -0+100%; 25 V
84496D05	.1 uF ±20%; 100 V
-82187B18	.0015 uF ±10%; 100 V
84496D07	.022 uF ±10%; 100 V
-83596E17	680 pF ±10%
-84538G02	4.7 uF ±20%; 20 V
-84538G04	15 uF ±20%; 20 V
-83406D06	39 pF
-84665F03	100 uF +100-10%; 25 V
-84665F06	220 uF +100-10%; 25 V
-84665F06	220 uF +100-10%; 25 V
-82187B32	150 pF ±10%; 100 V
-83596E09	.01 uF +80-20%; 200 V
-82372C04	.05 uF +80-20%; 25 V
-82187B20	.001 uF ±10%; 100 V
82905G08	.033 uF ±10%
82905G08	.033 uF ±10%
-82187B20	.001 uF ±10%; 100 V

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIP
C105	21-82187B20	.001 uF ±10%; 10
C106	23-84665F01	10 uF +100-10%; 2
C107	21-82428B15	.005 uF ±10
C108	8-82905G21	.018 uF ±10%; 50
C109	21-83596E32	.0011 uF; 200 V
C110	23-84665F01	10 uF +100-10%; 2
C111L	21-84494B19	470 pF
C111M, H	21-861440	470 pF; N2200
C111HH	21-84494B19	470 pF
C113L	21-84494B19	470 pF
C113M	21-84494B15	300 pF
C113H	21-84494B11	200 pF
C113HH	21-84494B52	91 pF
C114L	21-84494B21	650 pF
C114M	21-84494B20	510 pF
C114H	21-84494B19	470 pF
C114HH	21-84494B21	650 pF
C115	21-82428B59	.01 uF +80-20%; 2
C116	21-82428B59	.01 uF +80-20%; 2
C117L	21-84494B06	120 pF
C117M	21-82610C20	82 pF; 200 V; NP0
C117H	21-82610C43	62 pF; 100 V; NP0
C117HH	21-82204B29	43 pF; NP0
C118L	21-82450B32	2.7 pF
C118M	21-82450B17	2.2 pF
C118H	21-82450B19	1.8 pF
C118HH	21-82450B13	1.5 pF
C119L	21-84494B46	180 pF ±3%
C119M	21-82610C51	120 pF; N470
C119H	21-82610C20	82 pF; 200 V; NP0
C119HH	21-82204B51	62 pF; N330
C120L	21-84494B18	390 pF
C120M	21-84494B14	270 pF
C120H	21-84494B10	190 pF
C120HH	21-82610C44	100 pF; 100 V; N2
C121	21-82187B20	.001 uF ±10%; 10
C122	21-82450B44	.82 pF
C124	21-82428B59	.01 uF +80-20%; 2
C125	21-82187B20	.001 uF ±10%; 10
C126	21-83596E09	.01 uF +80-20%; 2
C127L	21-84494B46	180 pF ±3%
C127M	21-82610C51	120 pF; 200 V; N4
C127H	21-82610C20	82 pF; 200 V; NP0
C127HH	21-83406D46	56 pF; N150
C128L	21-84494B18	390 pF
C128M	21-84494B14	270 pF
C128H	21-84494B10	190 pF
C128HH	21-82610C70	150 pF; 200 V; N1
C129	21-82187B20	.001 uF ±10%; 10
C130L	21-84494B46	180 pF ±3%
C130M	21-82610C44	100 pF; 100 V; N2
C130H	21-82204B64	75 pF; N080
C130HH	21-82610C62	51 pF; 100 V; N15
C131L	21-84494B18	390 pF
C131M	21-84494B14	270 pF
C131H	21-84494B10	190 pF
C131HH	21-82610C44	100 pF; 100 V; N2
C132	21-82187B20	.001 uF ±10%; 10
C133	21-82372C04	.05 uF +80-20%; 2
C134L	21-84494B46	180 pF ±3%
C134M	21-82610C44	100 pF; 100 V; N2
C134H	21-84494B46	180 pF ±3%
C134HH	21-84494B52	91 pF
C136	21-82187B20	.001 uF ±10%; 10
C137	23-84538G04	15 uF +100-10%; 2
C139L	21-84494B01	51 pF
C139M	21-84494B52	91 pF
C139H	21-84494B04	100 pF
C139HH	21-84494B31	75 pF
C140	23-84665F01	10 uF +100-10%; 2
C141L	21-84494B19	470 pF
C141M, H	21-861440	470 pF; N2200
C141HH	21-84494B19	470 pF
C143L	21-84494B19	470 pF
C143M	21-84494B15	300 pF
C143H	21-84494B11	200 pF
C143HH	21-84494B52	91 pF
C144L	21-84494B21	650 pF
C144M	21-84494B20	510 pF
C144H	21-84494B19	470 pF
C144HH	21-84494B21	650 pF

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C145	21-82428B59	.01 uF +80-20%; 200 V
C147	21-82187B44	.001 uF ±10%; 100 V
C148	21-82372C04	.05 uF +80-20%; 25 V
C149	21-82187B44	.001 uF ±10%; 100 V
C150	21-82372C04	.05 uF +80-20%; 25 V
C151L	21-84494B46	180 pF ±3%
C151M	21-84494B52	91 pF
C151M	21-84494B31	75 pF
C151HH	21-84494B06	120 pF
C153	21-82428B59	.01 uF +80-20%; 200 V
C154	21-82187B20	.001 uF ±10%; 100 V
C155	21-82372C01	.1 uF +80-20%; 25 V
C157	21-82187B43	.0039 uF ±10%; 200 V
C158	21-82372C04	.05 uF +80-20%; 25 V
C159	23-84665F04	1 uF +150-0%; 50 V
C160	21-82187B20	.001 uF ±10%; 100 V
C161	23-84665F01	10 uF +100-10%; 25 V
		DIODE: (SEE NOTE I)
CR20,21	48-83510F03	silicon
CR60	48-83654H01	silicon
CR61	48-83654H01	silicon
CR75	48-83654H01	silicon
CR80	48-83654H01	silicon
CR90	48-82466H13	silicon rectifier
CR91	48-83654H01	silicon
CR92	48-83654H01	silicon
CR100	48-83654H01	silicon
CR101L	48-82190H05	varactor; 82 pF
CR101M	48-82190H05	varactor; 82 pF
CR101H	48-82190H05	varactor; 82 pF
CR101HH	48-82190H18	varactor; 120 pF
CR105	48-82139G01	germanium
CR107	48-83654H01	silicon
CR108L	48-82190H05	varactor; 82 pF
CR108M	48-82190H05	varactor; 82 pF
CR108H	48-82190H05	varactor; 82 pF
CR108HH	48-82190H18	varactor; 120 pF
CR110	48-83654H01	silicon
		LAMP:
DS601,602	65-83376K01	type GE#73; 14 V
		FUSE:
F601	65-86099	7 A; 32 V (25-watt models)
		CONNECTOR, receptacle:
J601		includes: 15-83292K01 SHELL; 29-84706E06 TERMINAL, female, 14 req'd.
J602	9-82442E09	female, single contact
		COIL, RF:
L1	24-84972A31	8-1/2 turns; BLU
L2	24-84972A31	8-1/2 turns; BLU
L3	24-84972A32	10-1/2 turns; ORG
L14	24-84419D04	22-1/2 turns; BLU
L15	24-84419D03	33-1/2 turns; GRN
L16	24-84419D03	33-1/2 turns; GRN
L17	24-82835G21	3.7 uH
L18	24-84419D04	22-1/2 turns; BLU
L19	24-82835G20	choke; 9.3 uH
L20	24-84972A06	8-1/2 turns; tapped at 3-5/8 turns
L23	24-82723H03	choke; 23 uH
L25L	24-84922C13	25-1/2 turns
L25M	24-84922C13	25-1/2 turns
L25H	24-84922C12	19-1/2 turns
L25HH	24-84922C12	19-1/2 turns
L26L	24-84922C13	25-1/2 turns
L26M	24-84922C13	25-1/2 turns
L26H	24-84922C12	19-1/2 turns
L26HH	24-84922C12	19-1/2 turns
L101L	24-83810G01	brown
L101M	24-83810G04	yellow
L101H	24-83810G03	orange
L101HH	24-83810G04	yellow
L102L	24-84972A27	8-1/2 turns; yellow
L102M	24-84972A28	8-1/2 turns; violet
L102H	24-84972A29	8-1/2 turns; green
L102HH	24-84972A30	8-1/2 turns; brown

REFERENCE SYMBOL	MOTOROLA PART NO.
L103	24-84972A
L104	24-82135G
L105	24-84972A
L106	24-84972A
L107	24-82190C
L108L	24-83884G
L108M	24-84411B
L108H	24-83884G
L108HH	24-83884G
L109	24-82190C
L110L	24-83884G
L110M	24-83884G
L110H	24-84411B
L110HH	24-83884G
L111L	24-83810G
L111M	24-83810G
L111H	24-83810G
L111HH	24-83810G
LS601	50-83291K
P601	
Q1	48-869943
Q2	48-869932
Q3	48-869932
Q4	48-869932
Q5	48-869571
Q6	48-869642
Q7	48-869528
Q8	48-869642
Q9	48-869642
Q10	48-134674
Q11	48-869642
Q12	48-869642
Q90	48-869643
Q100	48-869643
Q101	48-869642
Q102	48-869642
Q103	48-869932
Q104	48-869932
Q105	48-869932
Q106	48-869552
Q108	48-869932
Q109	48-869643
Q110	48-869643
Q111	48-869642
Q112	48-869641
R10	6-124C57
R11	6-124C25
R12	6-124C39
R20	6-124C41
R21	6-124C37
R22	6-124A75
R23	6-124C61
R24	6-124C61
R25	6-124C45
R26	6-124C45
R27	6-124C89
R28	6-124C89
R31	6-124C25
R32	6-124C83
R33	6-124C69
R34	6-124C47
R35	6-124C61
R36	6-124C83
R37	6-124C69
R38	6-124C47
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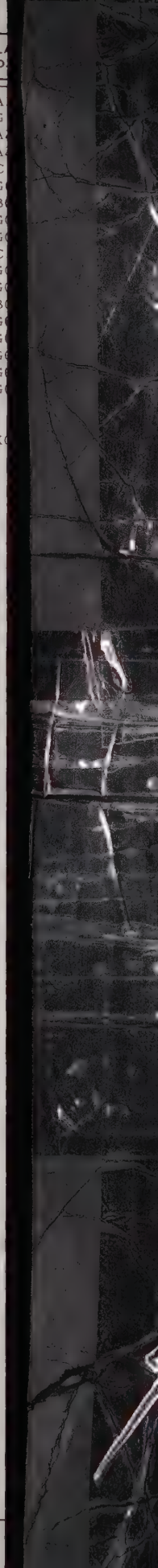
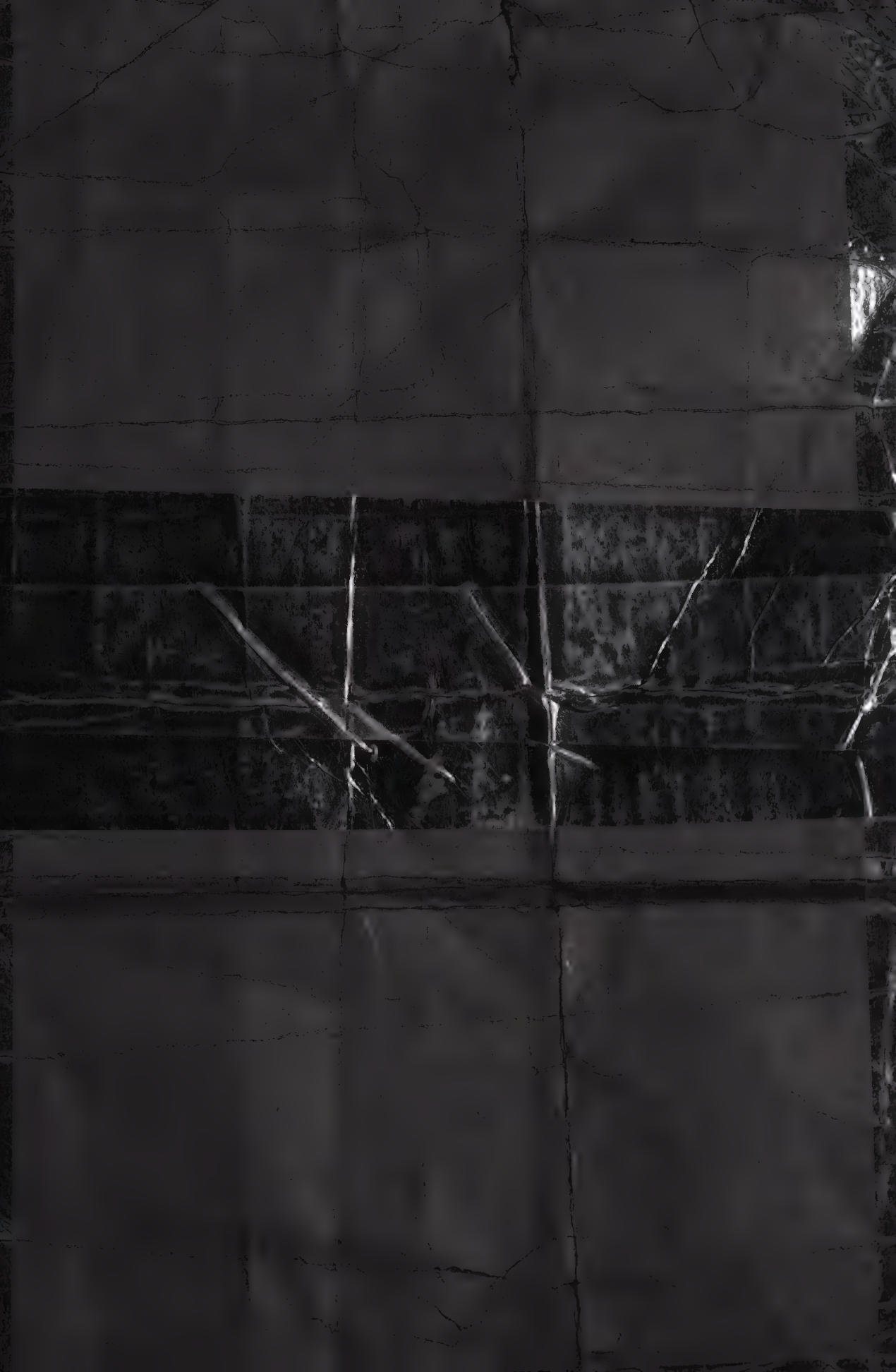
R50	6-124D06
R51	6-124C89
R52	6-124C85





DESCRIPTION
8-1/2 turns; blue
100 uH
8-1/2 turns; violet
8-1/2 turns; green
1.2 uH
9-1/2 turns; white
11-1/2 turns; green
9-1/2 turns; white
5-1/2 turns; orange
1.2 uH
7-1/2 turns; yellow
9-1/2 turns; white
11-1/2 turns; green
9-1/2 turns; white
brown
yellow
orange
yellow
SPEAKER:
3-1/2 inch; 4 ohms
CONNECTOR, plug:
includes: 15-83293K01 SHELL: 29-84706E05 TERMINALS, male
TRANSISTOR: (SEE NOTE 1)
field-effect; M9943
NPN; M9932
NPN; M9932
NPN; M9932
NPN; M9571
NPN; M9642
NPN; M9528
NPN; M9642
NPN; M9642
NPN; M54 (WHT DOT)
NPN; M9642
NPN; M9642
PNP; M9643
PNP; M9643
NPN; M9642
NPN; M9642
NPN; M9932
NPN; M9932
NPN; M9932
NPN; M9552
NPN; M9932
PNP; M9643
PNP; M9643
NPN; M9642
PNP; M9641
RESISTOR, fixed: ±10%; 1/4 W; unless otherwise stated
2.2k
100
390
470
330
12k ±5%
3.3k
3.3k
680
680
47k
47k
100
27k
6.8k
820
3.3k
27k
6.8k'
820
3.3k
47 ±5%
220k
47k
33k

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R53	6-124C13	33
R59	6-124C73	10k
R60	6-124C59	2.7k
R61	6-124A78	16k ±5%
R62	6-124A92	62k ±5%
R63	6-124A43	560 ±5%
R64	6-124C57	2.2k
R65	6-124A67	5.6k ±5%
R66	6-124C13	33
R67	6-124C25	100
R68	6-124D70	1.0 1/2 W
R69	17-82036G13	.75 ±5%; 2 W
R70	6-124C87	39k
R75	6-124C97	100k
R76	6-124A81	22k ±5%
R77	6-124C93	68k
R78	6-124C33	220
R79	6-124D10	330k
R80	6-124A67	5.6k ±5%
R81	6-124A22	75 ±5%
R82	6-124A49	1k ±5%
R83	6-124B04	180k ±5%
R84	6-124C89	47k
R85	6-124C63	3.9k
R86	6-124C63	3.9k
R87	6-124C61	3.3k
R88	6-124A92	62k ±5%
R89	6-124C59	2.7k
R90	6-124A97	100k ±5%
R91	6-124A79	18k ±5%
R93	6-124A10	24 ±5%
R94	6-124C51	1.2k
R101	6-124C47	820 ±10%
R102	6-124A83	27k
R103	6-124A93	68k
R104	6-124A83	27k
R105	6-124A93	68k
R106	6-124A26	110
R107	6-124A26	110
R108	6-124A77	15k
R109	6-124A39	390
R110	6-124A63	3.9k
R111	6-124A73	10k
R112	6-124A71	8.2k
R113	6-124A59	2.7k
R114	18-84944C02	variable; 25k
R115	6-124C67	5.6k ±10%
R116	6-124A92	62k
R117	6-124A95	82k
R118	6-124A71	8.2k
R119	6-124A71	8.2k
R120L	6-124A43	560
R120M	6-124A43	560
R120H	6-124A45	680
R120HH	6-124A45	680
R121	6-124C73	10k ±10%
R122	6-124A49	1k
R123	6-124A73	10k
R124	6-124A19	56
R125	6-124C31	180 ±10%
R126	6-124C53	1.5k ±10%
R127	6-124C89	47k ±10%
R128	6-124C25	100 ±10%
R129	6-124A27	120
R130	6-124C63	3.9k ±10%
R131	6-124C09	22 ±10%
R132	18-84944C02	variable; 25k
R133	6-124C67	5.6k ±10%
R134	6-124A92	62k
R135	6-124A95	82k
R136	6-124A71	8.2k
R137	6-124A71	8.2k
R138L	6-124A43	560
R138M	6-124A43	560
R138H	6-124A45	680
R138HH	6-124A45	680
R139	17-82036G49	.05; 2 W
R140	6-124C47	820 ±10%; 1/2 W
R141	6-124C09	22 ±10%
R142	18-84944C10	variable; 1k
R143	6-124C35	270 ±10%

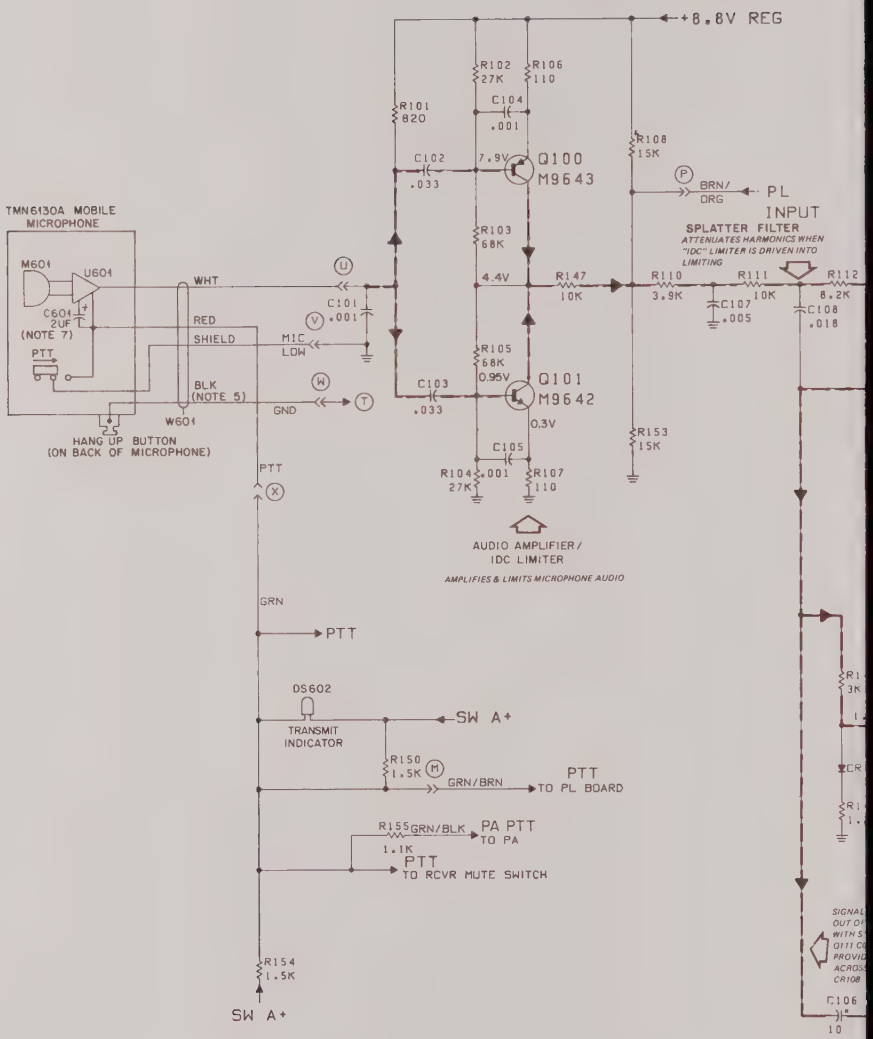
RENCE MBOL	MOTOROLA PART NO.	DESCRIPTION
	6-125C29	150 ±10%; 1/2 W
	6-124B57	3.3
	6-124A53	1.5k
	6-124A73	10k
	6-124A60	3.0k
	6-124A51	1.2k
	6-124C53	1.5k ±10%
	6-125C33	220 ±10%; 1/2 W
	6-124C81	22k ±10%
	6-124A77	15k
	6-124C53	1.5k ±10%
	6-124A50	1.1k
		RESISTORS:
	18-83288K01	var; 100k; 30% @1/2 rotation
	18-83287K01	var; 100k
		SWITCH ASSEMBLY:
		P/O R601
,603,604	40-83290K01	3-dpdt ("PL" & 2-freq.)
	40-83290K02	1-dpdt ("PL" only)
,604	40-83290K03	2-dpdt (2-freq. only)
		INTEGRATED CIRCUIT:
		(SEE NOTE 1)
	51-84320A78	type CA3089
	51-84320A77	type TBA-810AS
		VOLTAGE REGULATOR:
0	48-82256C50	Zener type; 13 V
0	48-82256C56	Zener type; 8.8 V
01	48-82256C56	Zener type; 8.8 V ±10%
		FUSEHOLDER:
01	14-82882A01	BODY, fuseholder
	14-82883A01	CAP, fuseholder
	29-84706E05	PIN, male; 4 req'd.
	41-82885A01	SPRING, fuseholder
	42-82884A01	CLIP, fuse; 2 req'd.
		CRYSTAL UNIT: (SEE NOTE II)
2	KXN6159AA	35.7 - 60.7 MHz
5	48-83540L05	10.7 MHz (YEL/BLK)
	48-83540L04	10.7 MHz (BLU/ORG)
1,102	KXN6158AA	12-18 MHz
NON-REFERENCED ITEMS (RECEIVER)		
	9-84871G01	SOCKET, crystal (F1-F2)
	26-82570L01	HEATSINK (audio)
	26-83264F01	SHIELD, coil (L18)
	26-84598A01	SHIELD, coil (L1, L2, L3, L20)
	26-84480G01	SHIELD, coil (L16)
	26-84800H07	SHIELD, coil (L25, L26)
	26-84598A02	SHIELD, coil (L14, L15)
NON-REFERENCED ITEMS (EXCITER)		
	76-83960B01	FERRITE BEAD
	9-84871G01	SOCKET, crystal
	26-84598A01	SHIELD, coil (aluminum)
OTHER NON-REFERENCED ITEMS		
	9-83396K02	SOCKET, lamp; for DS601
	9-83396K03	SOCKET, lamp; for DS602
	38-82592L01	BUTTON, push; WHT
	38-82592L02	BUTTON, push; ORG
	15-83128K01	HOUSING
	33-83418K01	NAMEPLATE
	33-83137K01	NAMEPLATE, FCC
	36-83132K01	KNOB, Control

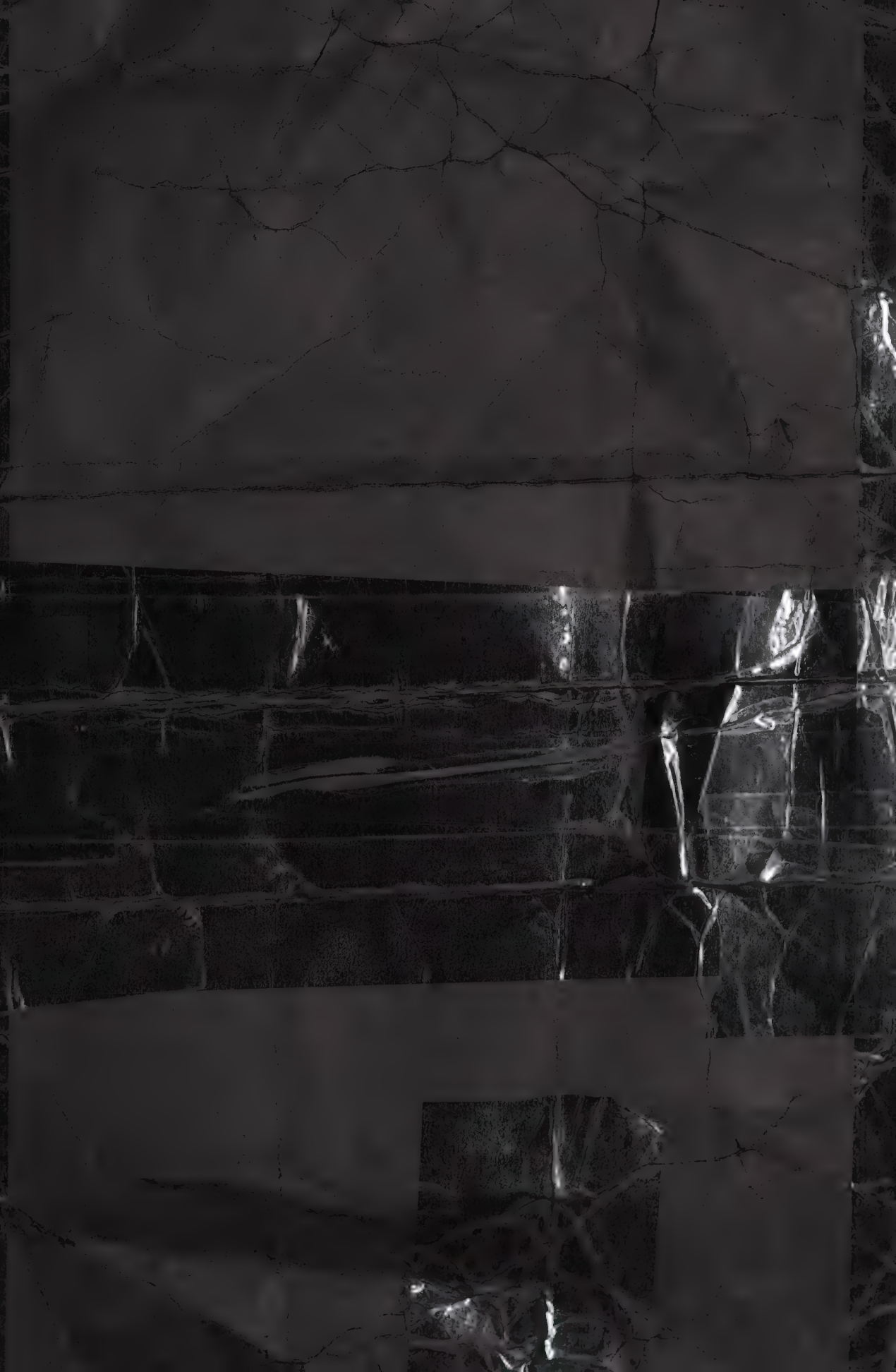
:S:

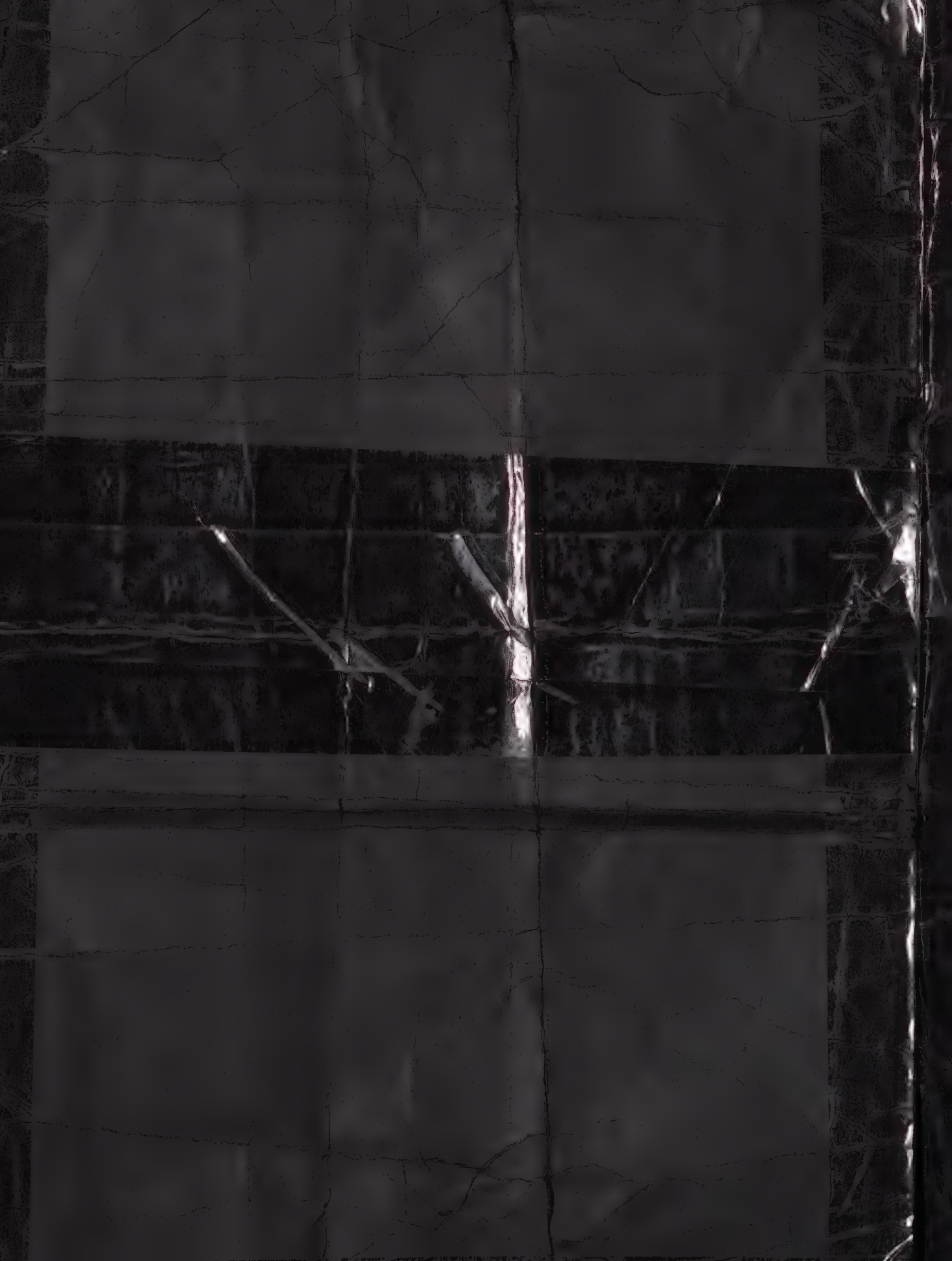
leplacement diodes, transistors, and integrated circuits nust be ordered by Motorola part number for optimum erformance.

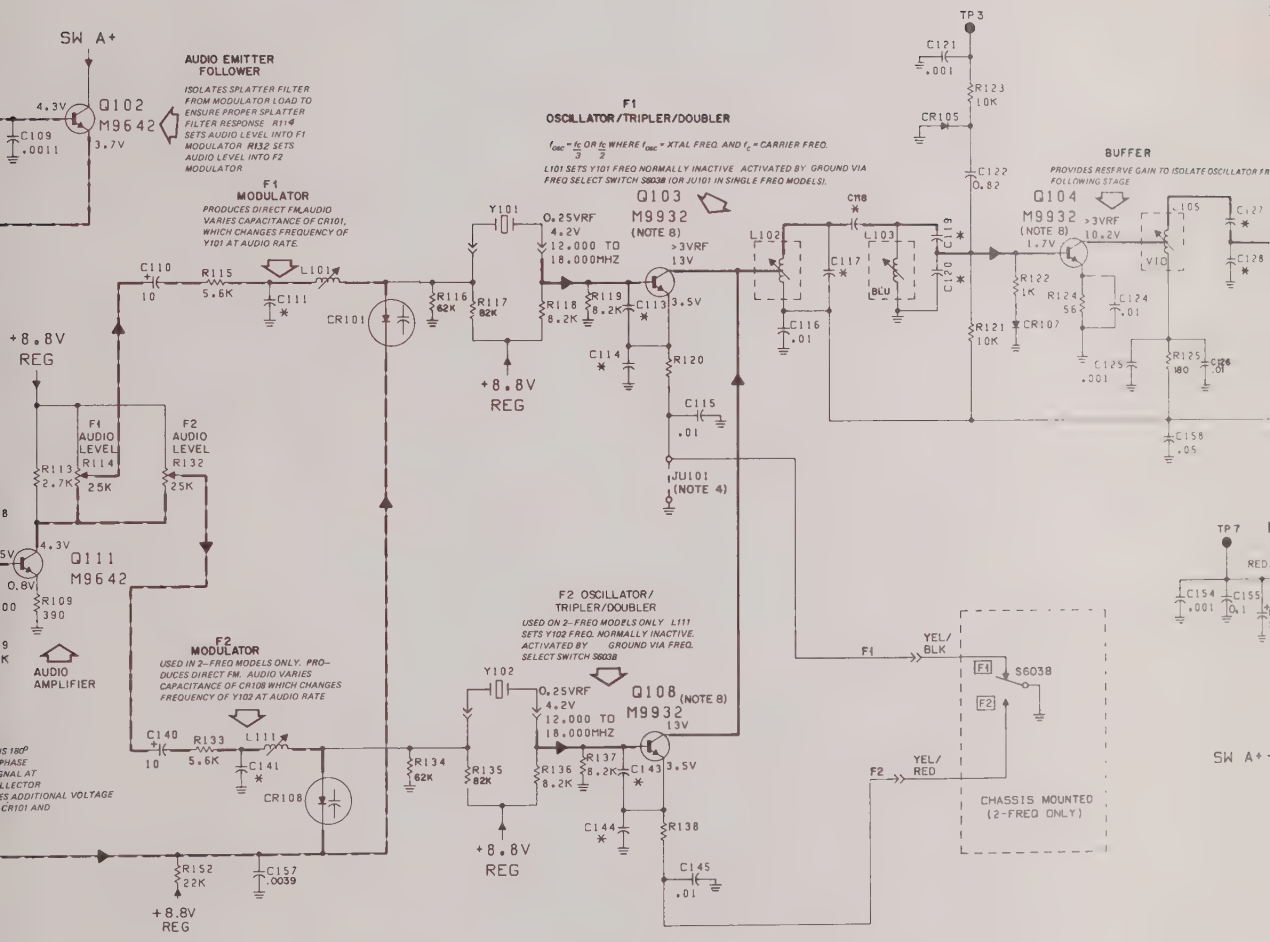
When ordering quartz crystal unit or ceramic resonators, pecify carrier frequency, crystal (or resonator) fre- uency and crystal (or resonator) type number.

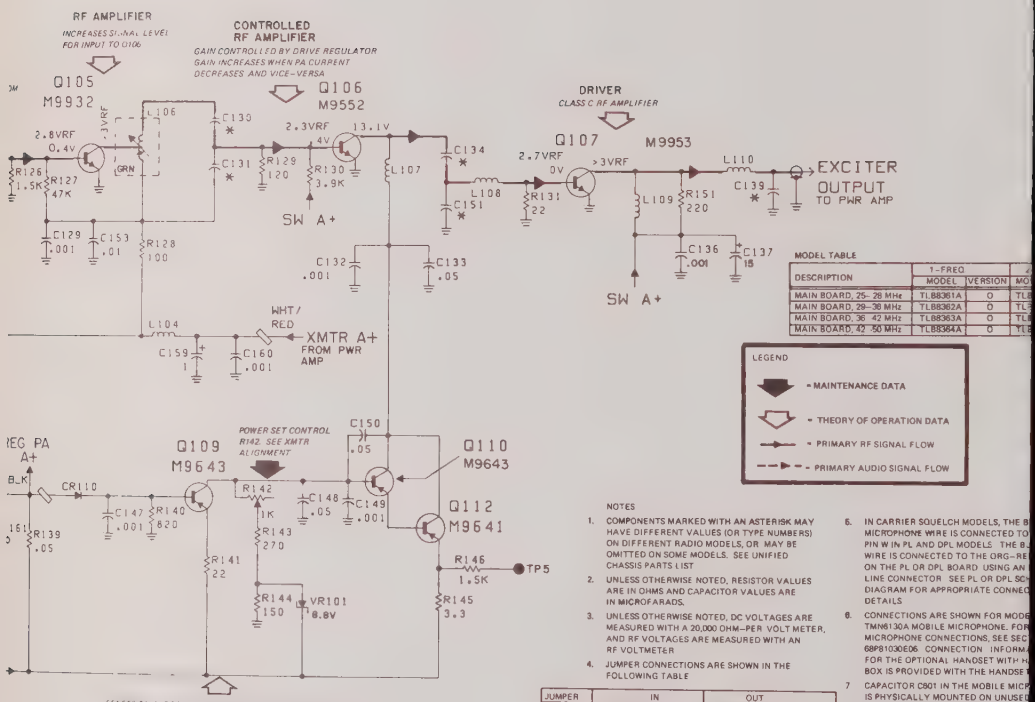
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
TMN6130A Mobile Microphone		PL-5333-A
C901	23-84669A27	CAPACITOR, fixed: 2 uF
S904	40-84622B07	SWITCH, slide: dpdt
U901	51-84333G79	HYBRID CIRCUIT: hybrid preamplifier
W901	30-83586L01	CORD, microphone; coiled: 4 conductor; includes 39-10184A24 TERMINAL PIN (4 req'd.) female 29-83277G02 LUG (4 req'd.) 41-83576L01 SPRING, strain relief
NON-REFERENCED ITEMS		
	50-83905L01	DYNAMIC CARTRIDGE
	33-83577L01	NAMEPLATE
	33-83574L01	PUSHBUTTON
	3-139797	SCREWS, tapping; #5-20 x 5/8"; 3 req'd.
	4-001725	WASHER, flat
	4-82707B01	WASHER, flat
	5-855939	RIVET, shoulder
	15-83572L01	HOUSING, back
	15-83573L01	HOUSING, front
	29-005247	LUG
	35-83575L01	GRILL CLOTH


+8.8V REG
R102 27K
R106 110
C104 .001
R101 820
R108 15K
C102 .033
7.9V
Q100 M9643
P
BRN/ ORG
PL INPUT
SPLATTER FILTER
ATTENUATES HARMONICS WHEN "IDC" LIMITER IS DRIVEN INTO LIMITING
R103 68K
TMN6130A MOBILE MICROPHONE
M601
U604
C601 2UF (NOTE 7)
PTT
WHT
RED
SHIELD
BLK (NOTE 5)
W601
HANG UP BUTTON (ON BACK OF MICROPHONE)
U
V
W
T
C101 .001
MIC LOW
GND
4.4V
R147 10K
R110 3.9K
R111 10K
R112 8.2K
C107 .005
C108 .018
R105 68K
0.95V
Q101 M9642
C103 .033
0.3V
R153 15K
C105 .001
R104 27K
R107 110
PTT
X
AUDIO AMPLIFIER / IDC LIMITER
AMPLIFIES & LIMITS MICROPHONE AUDIO
GRN
PTT
DS602
TRANSMIT INDICATOR
SW A+
R150 1.5K
M
GRN/BRN
PTT TO PL BOARD
R155 1.1K
GRN/BLK
PA PTT TO PA
PTT TO RCVR MUTE SWITCH
R154 1.5K
SW A+
C106 10






SW A+
AUDIO EMITTER FOLLOWER
ISOLATES SPLATTER FILTER FROM MODULATOR LOAD TO ENSURE PROPER SPLATTER FILTER RESPONSE R114 SETS AUDIO LEVEL INTO F1 MODULATOR R132 SETS AUDIO LEVEL INTO F2 MODULATOR
Q102 M9642
4.3V
3.7V
C109 .0011
F1 MODULATOR
PRODUCES DIRECT FM. AUDIO VARIES CAPACITANCE OF CR101, WHICH CHANGES FREQUENCY OF Y101 AT AUDIO RATE.
C110 10
R115 5.6K
L101
C111 *
CR101
R116 62K
R117 82K
+8.8V REG
F1 OSCILLATOR/TRIPLER/DOUBLER
$f_{osc} = \frac{f_c}{3}$ OR $\frac{f_c}{2}$ WHERE f_{osc} = XTAL FREQ. AND f_c = CARRIER FREQ.
L101 SETS Y101 FREQ NORMALLY INACTIVE ACTIVATED BY GROUND VIA FREQ SELECT SWITCH S6038 (OR JU101 IN SINGLE FREQ MODELS).
Y101
0.25VRF
4.2V
12.000 TO 18.000MHZ
Q103 M9932 (NOTE 8)
>3VRF 13V
R118 8.2K
R119 8.2K
C113 *
3.5V
C114 *
R120
C115 .01
JU101 (NOTE 4)
L102
C116 .01
C117 *
C118 *
L103
BLU
C119 *
C120 *
TP3
C121 .001
R123 10K
CR105
C122 0.82
BUFFER
PROVIDES RESERVE GAIN TO ISOLATE OSCILLATOR FR FOLLOWING STAGE
Q104 M9932 (NOTE 8)
1.7V
>3VRF 10.2V
R122 1K
R124 56
C124 .01
R121 10K
CR107
C125 .001
R125 180
C126 .01
C158 .05
L105
VIO
C127 *
C128 *
+8.8V REG
F1 AUDIO LEVEL R114 25K
F2 AUDIO LEVEL R132 25K
R113 2.7K
Q111 M9642
4.3V
0.8V
R109 390
AUDIO AMPLIFIER
F2 MODULATOR
USED IN 2-FREQ MODELS ONLY. PRODUCES DIRECT FM. AUDIO VARIES CAPACITANCE OF CR108 WHICH CHANGES FREQUENCY OF Y102 AT AUDIO RATE
C140 10
R133 5.6K
L111
C141 *
CR108
R134 62K
R135 82K
+8.8V REG
F2 OSCILLATOR/TRIPLER/DOUBLER
USED ON 2-FREQ MODELS ONLY L111 SETS Y102 FREQ. NORMALLY INACTIVE. ACTIVATED BY GROUND VIA FREQ. SELECT SWITCH S6038
Y102
0.25VRF
4.2V
12.000 TO 18.000MHZ
Q108 M9932 (NOTE 8)
13V
R136 8.2K
R137 8.2K
C143 *
3.5V
C144 *
R138
C145 .01
R152 22K
C157 .0039
+8.8V REG
F1
YEL/BLK
F2
YEL/RED
S6038
CHASSIS MOUNTED (2-FREQ ONLY)
TP7
RED
C154 .001
C155 0.1
SW A+



MODEL TABLE

DESCRIPTION	1-FREQ MODEL	1-FREQ VERSION	MO
MAIN BOARD, 25-28 MHz	TLB8361A	0	TLB
MAIN BOARD, 29-36 MHz	TLB8362A	0	TLB
MAIN BOARD, 36-42 MHz	TLB8363A	0	TLB
MAIN BOARD, 42-50 MHz	TLB8364A	0	TLB

LEGEND
- = MAINTENANCE DATA
- = THEORY OF OPERATION DATA
- = PRIMARY RF SIGNAL FLOW
- = PRIMARY AUDIO SIGNAL FLOW

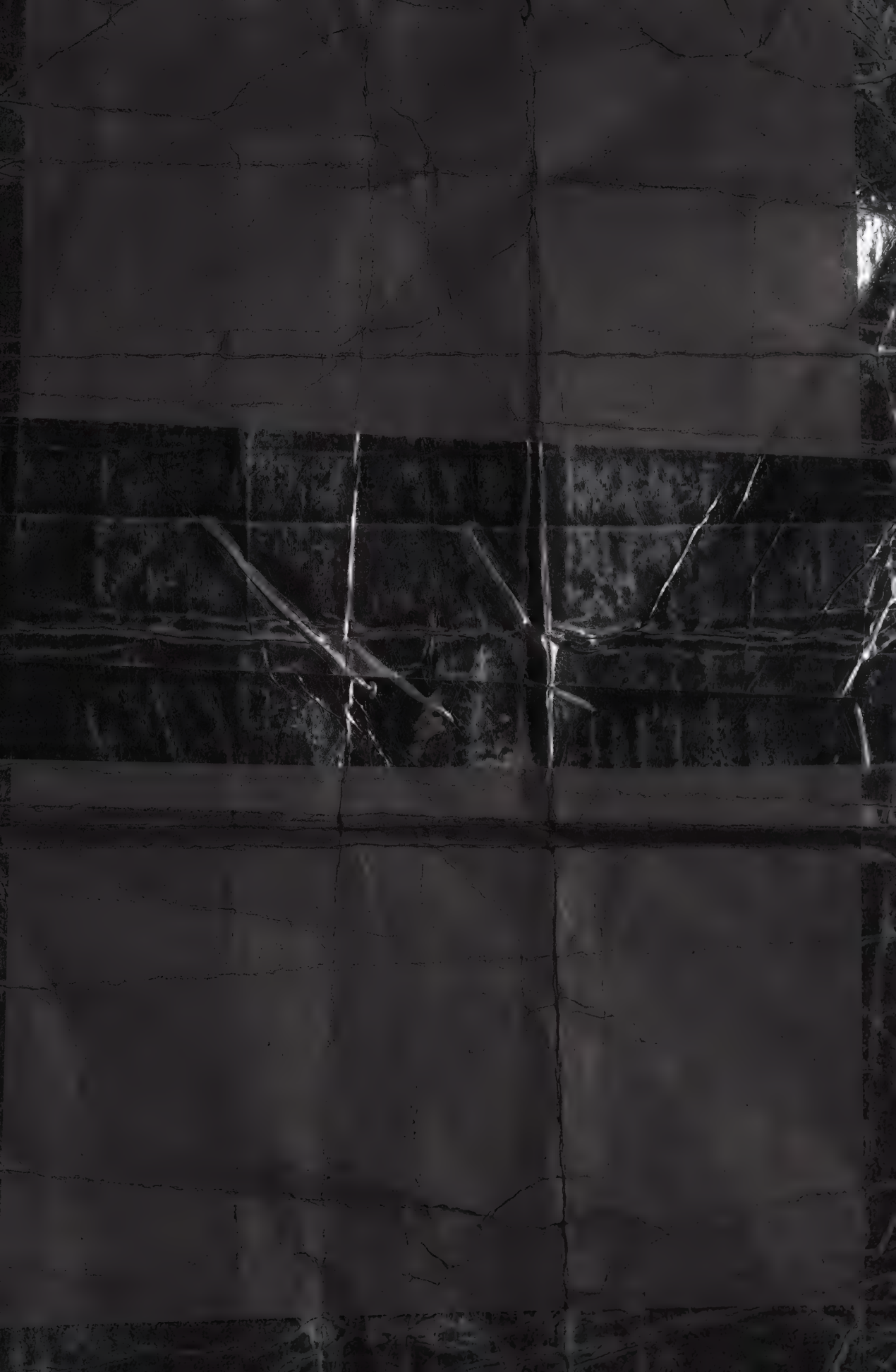
NOTES

1. COMPONENTS MARKED WITH AN ASTERISK MAY HAVE DIFFERENT VALUES (OR TYPE NUMBERS) ON DIFFERENT RADIO MODELS, OR MAY BE OMITTED ON SOME MODELS. SEE UNIFIED CHASSIS PARTS LIST
2. UNLESS OTHERWISE NOTED, RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES ARE IN MICROFARADS.
3. UNLESS OTHERWISE NOTED, DC VOLTAGES ARE MEASURED WITH A 20,000 OHM-PER VOLT METER, AND RF VOLTAGES ARE MEASURED WITH AN RF VOLTMETER
4. JUMPER CONNECTIONS ARE SHOWN IN THE FOLLOWING TABLE

JUMPER	IN	OUT
JU1	ALL MODELS	
JU2	(NOT USED)	(NOT USED)
JU3	ONE-FREQ MODELS	TWO-FREQ MODELS
JU4	ONE-FREQ MODELS	TWO-FREQ MODELS
JU5	ALL MODELS	-
JU6	ALL MODELS	-
JU7	CARRIER SQUELCH & "DIGITAL PRIVATE-LINE" MODELS	TONE-CODED "PRIVATE-LINE" MODELS
JU101	ONE-FREQ MODELS	TWO-FREQ MODELS
JU801	ALL MODELS	OPTIONAL (DISABLES PWR ON L/MP)

5. IN CARRIER SQUELCH MODELS, THE B... MICROPHONE WIRE IS CONNECTED TO ... PIN W IN PL AND DPL MODELS THE B... WIRE IS CONNECTED TO THE ORG-RE... ON THE PL OR DPL BOARD USING AN ... LINE CONNECTOR SEE PL OR DPL SCH... DIAGRAM FOR APPROPRIATE CONNEC... DETAILS
6. CONNECTIONS ARE SHOWN FOR MODE... TMN6130A MOBILE MICROPHONE. FOR ... MICROPHONE CONNECTIONS, SEE SEC... 68P81030E06 CONNECTION INFORMA... FOR THE OPTIONAL HANDSET WITH H... BOX IS PROVIDED WITH THE HANDSE...
7. CAPACITOR C601 IN THE MOBILE MICP... IS PHYSICALLY MOUNTED ON UNUSE... TACTS OF PTT SWITCH
8. TRANSISTORS Q103, Q104, Q105, AND Q108 MAY BE TYPE M9484.

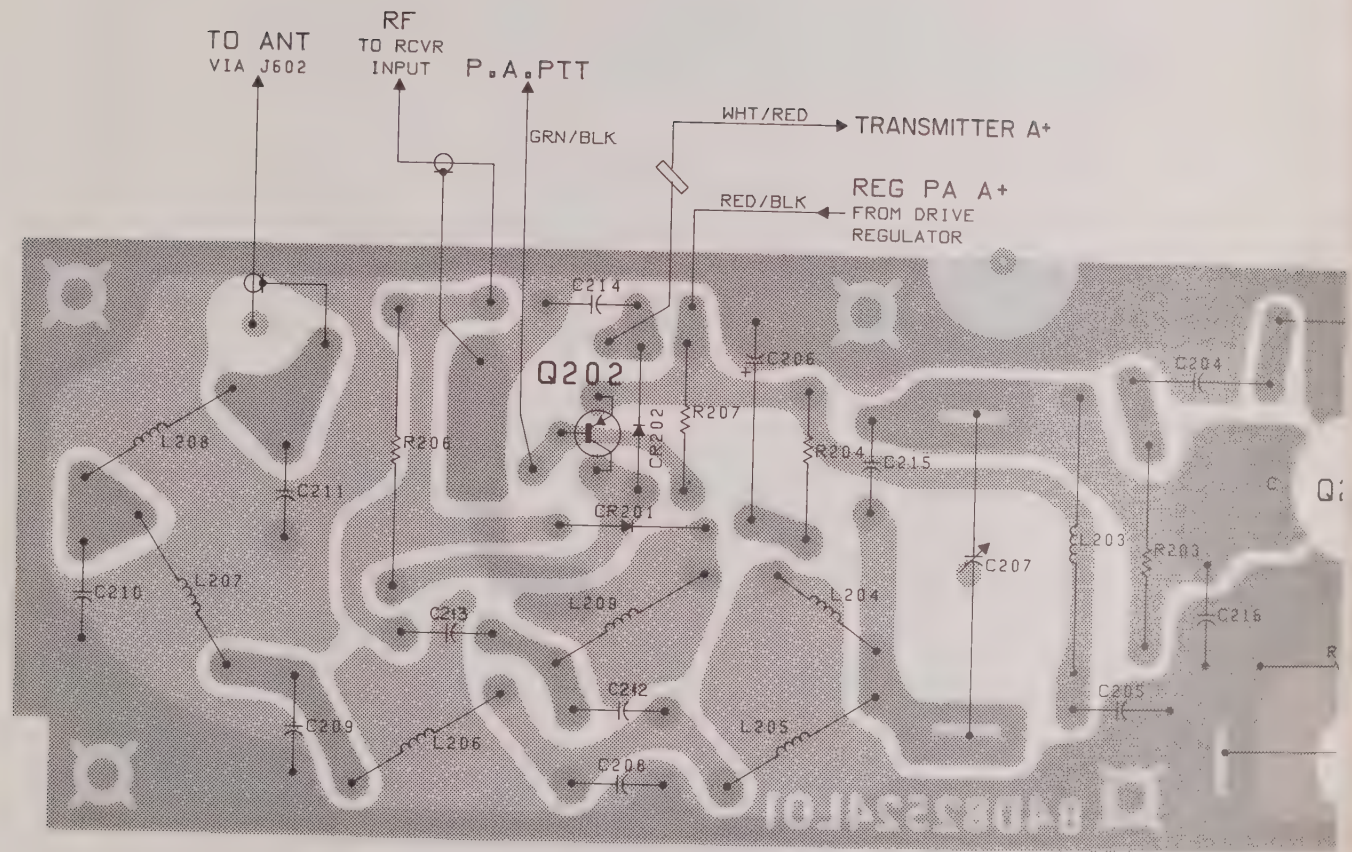
EEPS-24391-O



UNIFIED CHASSIS EXCITER SECTION

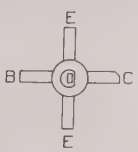
FUNCTION

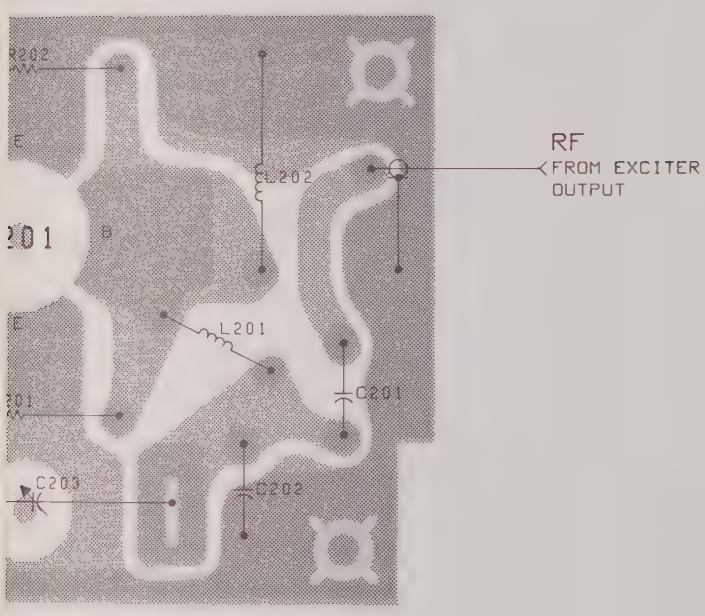
Amplifies voice signals from the microphone and produces a low-level FM modulated rf signal for the rf power amplifier.



SHOWN FROM COMPONENT SIDE

TRANSISTOR BASE DETAIL





OMPONENT SIDE BD-DEPS-23905-O
SOLDER SIDE ※ BD-DEPS-23901-O
OL-DEPS-23902-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRI

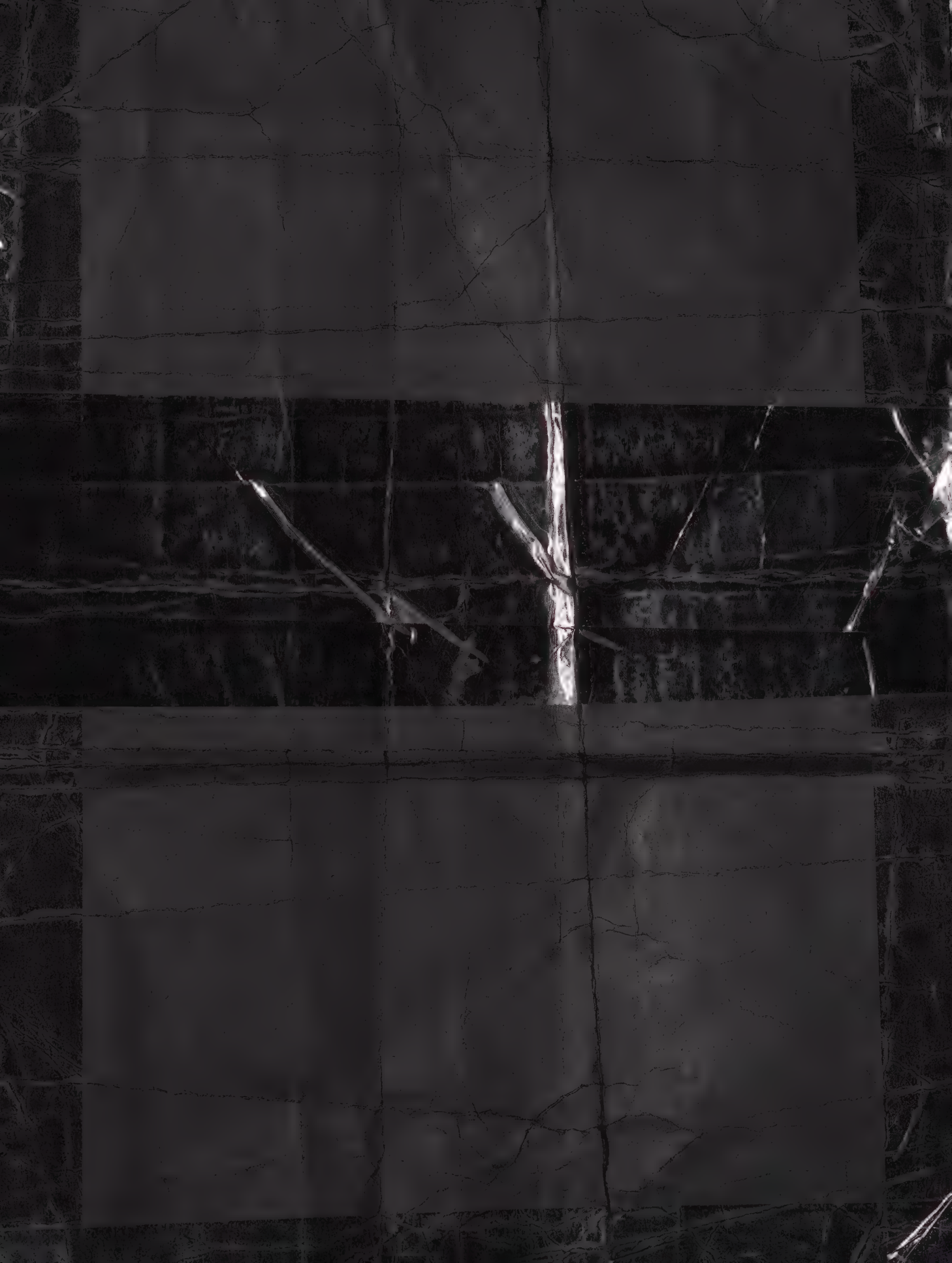
PARTS LIST

25-WATT POW

LEGE
L = 25-2
M = 29.7
H = 36-4
HH = 42-

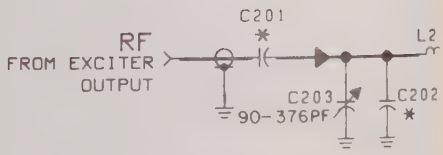
TLB1521A (25-28 MHz)
TLB1522A (29.7-36 MHz)
TLB1523A (36-42 MHz)
TLB1524A (42-50 MHz)

		CAPACITOR, F unless otherwi
C201L	21-84494B03	80 pF
C201M	21-84494B34	68 pF
C201H	21-84494B02	62 pF
C201HH	21-84494B35	60 pF
C202L	21-84494B11	200 pF
C202M	21-84494B26	130 pF
C202H	21-84494B06	120 pF
C202HH	21-84494B04	100 pF
C203	20-84218B06	variable; 90-37
C204	8-83514E02	0.1 uF ±10%
C205	21-82187B44	.001 uF ±10%
C206	23-84762H03	10 uF
C207L,207M, 207H	20-84218B06	variable; 90-37
C207HH	20-84218B07	variable; 55-28
C208L	21-84494B05	105 pF
C208M	21-84494B52	91 pF
C208H	21-84494B03	80 pF
C208HH	21-84494B02	62 pF
C209L	21-84494B11	200 pF
C209M	21-84494B51	160 pF
C209H	21-84494B27	140 pF
C209HH	21-84494B05	105 pF
C210L	21-84494B11	200 pF
C210M	21-84494B08	170 pF
C210H	21-84494B27	140 pF
C210HH	21-84494B53	110 pF
C211L	21-84494B05	105 pF
C211M	21-84494B52	91 pF
C211H	21-84494B03	80 pF
C211HH	21-84494B02	62 pF
C212L	21-84494B06	120 pF
C212M,212H	21-84494B52	91 pF
C212HH	21-84494B31	75 pF
C213L	21-84494B06	120 pF
C213M,213H	21-84494B52	91 pF
C213HH	21-84494B31	75 pF
C214	21-82187B44	.001 uF ±10%
C215L	21-84494B51	160 pF
C215M	21-84494B34	68 pF
C215H	21-84494B02	62 pF
C215HH	21-84494B33	30 pF
C216L	21-84494B34	68 pF
C216M	21-84494B43	36 pF
		DIODE: (SEE
CR201	48-83510F04	silicon
CR202	48-82139G01	germanium
		COIL, RF:
L201L	24-83884G04	7-1/2 turns; Y
L201M	24-83884G09	6-1/2 turns; B
L201H	24-83884G08	5-1/2 turns; G
L201HH	24-83884G06	4-1/2 turns; W
L202	24-83977B02	choke
L203	24-82190C15	1.2 uH
L204L,204M	24-83542L02	4-1/2 turns
L204H, 204HH	24-83542L01	3-1/2 turns
L205L,205M	24-83542L07	9-1/2 turns
L205H, 205HH	24-83542L05	7-1/2 turns
L206L	24-83542L07	9-1/2 turns
L206M	24-83542L06	8-1/2 turns
L206H	24-83542L05	7-1/2 turns
L206HH	24-83542L04	6-1/2 turns
L207L	24-83542L08	10-1/2 turns
L207M	24-83542L07	9-1/2 turns
L207H	24-83542L06	8-1/2 turns
L207HH	24-83542L05	7-1/2 turns
L208L	24-83542L07	9-1/2 turns
L208M	24-83542L06	8-1/2 turns



REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
L208H	24-83542L05	7-1/2 turns
L208HH	24-83542L04	6-1/2 turns
L209L	24-83542L06	8-1/2 turns
L209M	24-83542L05	7-1/2 turns
L209H	24-83542L04	6-1/2 turns
L209HH	24-83542L03	5-1/2 turns
		TRANSISTOR: (SEE NOTE)
Q202	48-869643	PNP; type M9643
		RESISTOR, fixed:
R201	6-125C01	10 ±10%; 1/2 W
R202,203	6-125A18	51 ±5%; 1/2 W
R204	6-124D61	4.7 ±10%; 1/4 W
R205		NOT USED
R206	6-126A35	270 ±5%; 1 W
R207	6-124C33	220 ±10%; 1/4 W
NON-REFERENCED ITEM		
	26-82320L02	HEATSINK, transistor

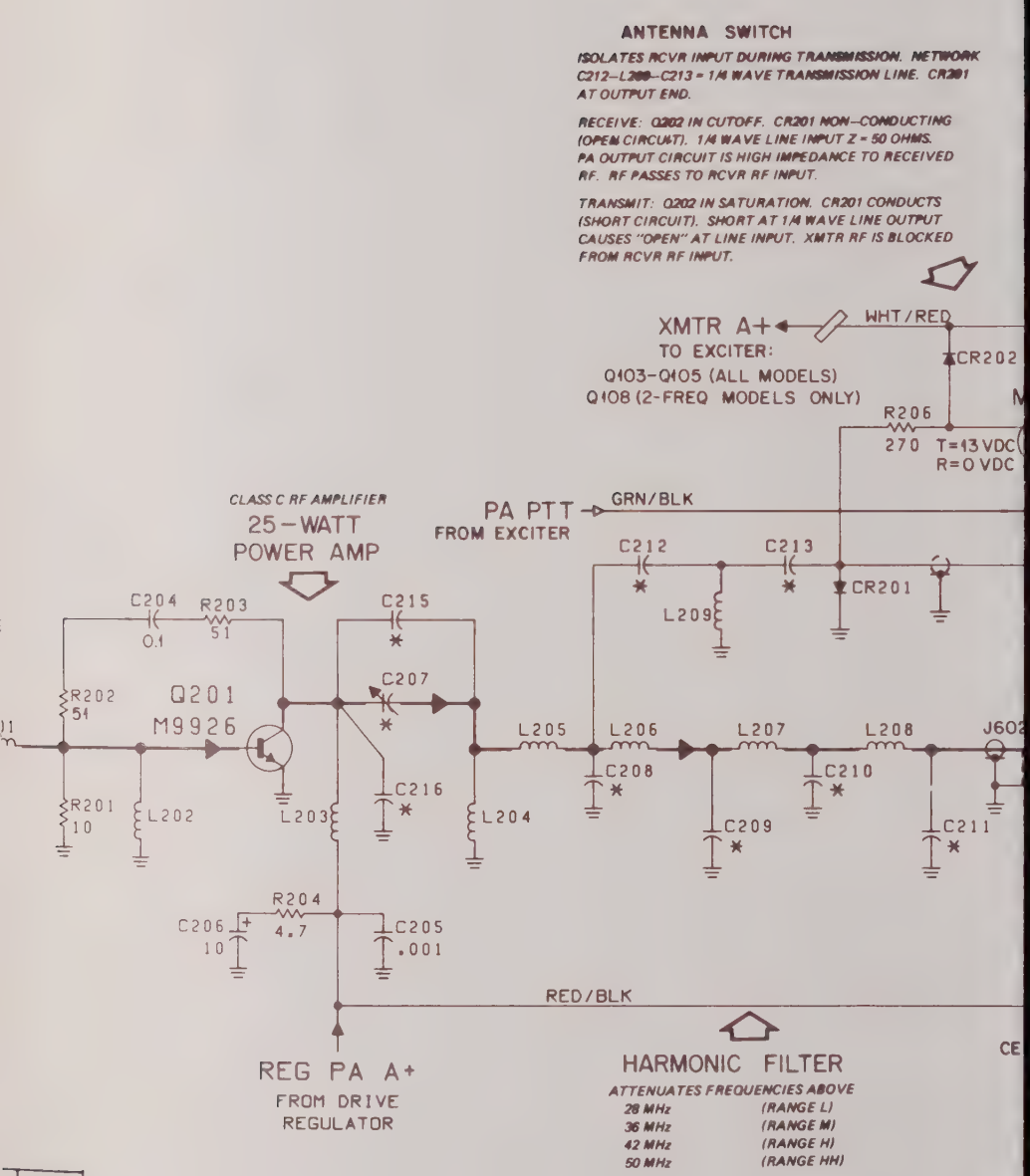
NOTE:
Replacement diodes, transistors and integrated circuits must be ordered by Motorola part number for optimum performance.



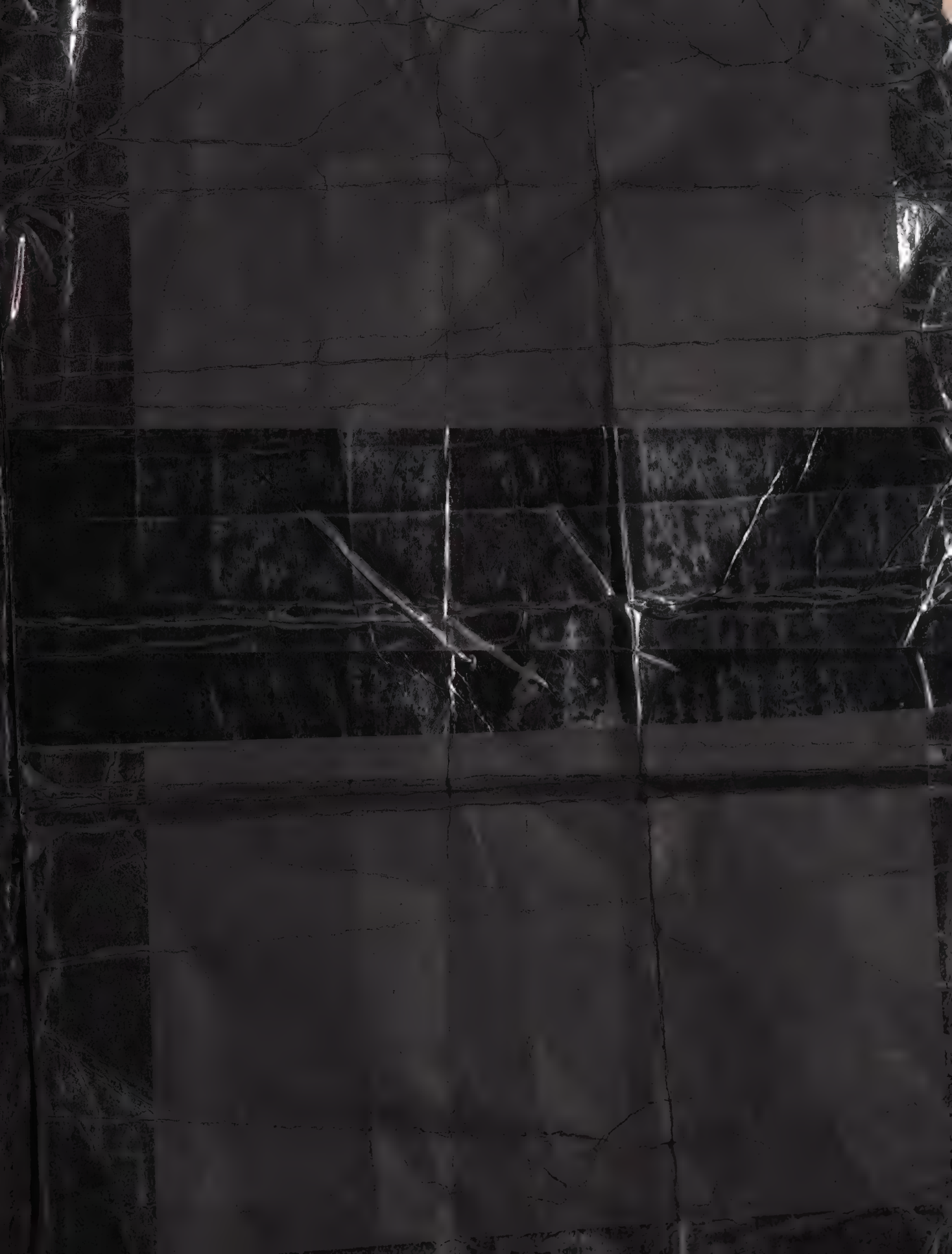
NOTES
1. COMPONENTS MARKED WITH AN ASTERISK MAY HAVE DIFFERENT VALUES (OR TYPE NUMBERS) ON DIFFERENT RADIO MODELS SEE PARTS LIST.
2. UNLESS STATED OTHERWISE, RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES ARE IN MICROFARADS

MODEL TABLE

DESCRIPTION	MODEL
PWR AMP AND HEAT SINK, 25-28 MHz	TLB1521
PWR AMP AND HEAT SINK, 29-36 MHz	TLB1522
PWR AMP AND HEAT SINK, 36-42 MHz	TLB1523
PWR AMP AND HEAT SINK, 42-50 MHz	TLB1524



	VERSION
A	0
A	0
A	0
A	0

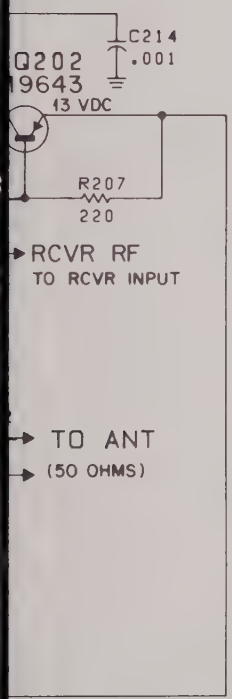


25-WATT POWER AMPLIFIER, RMONIC FILTER, AND ANTENNA SWITCH

TLB1521A (25-28 MHz)
TLB1522A (29.7-36 MHz)
TLB1523A (36-42 MHz)
TLB1524A (42-50 MHz)

FUNCTION

Optimally increases power output of radio to 25 watts.



PS-24392-O

68P81036E44-O
6/27/77-NPC

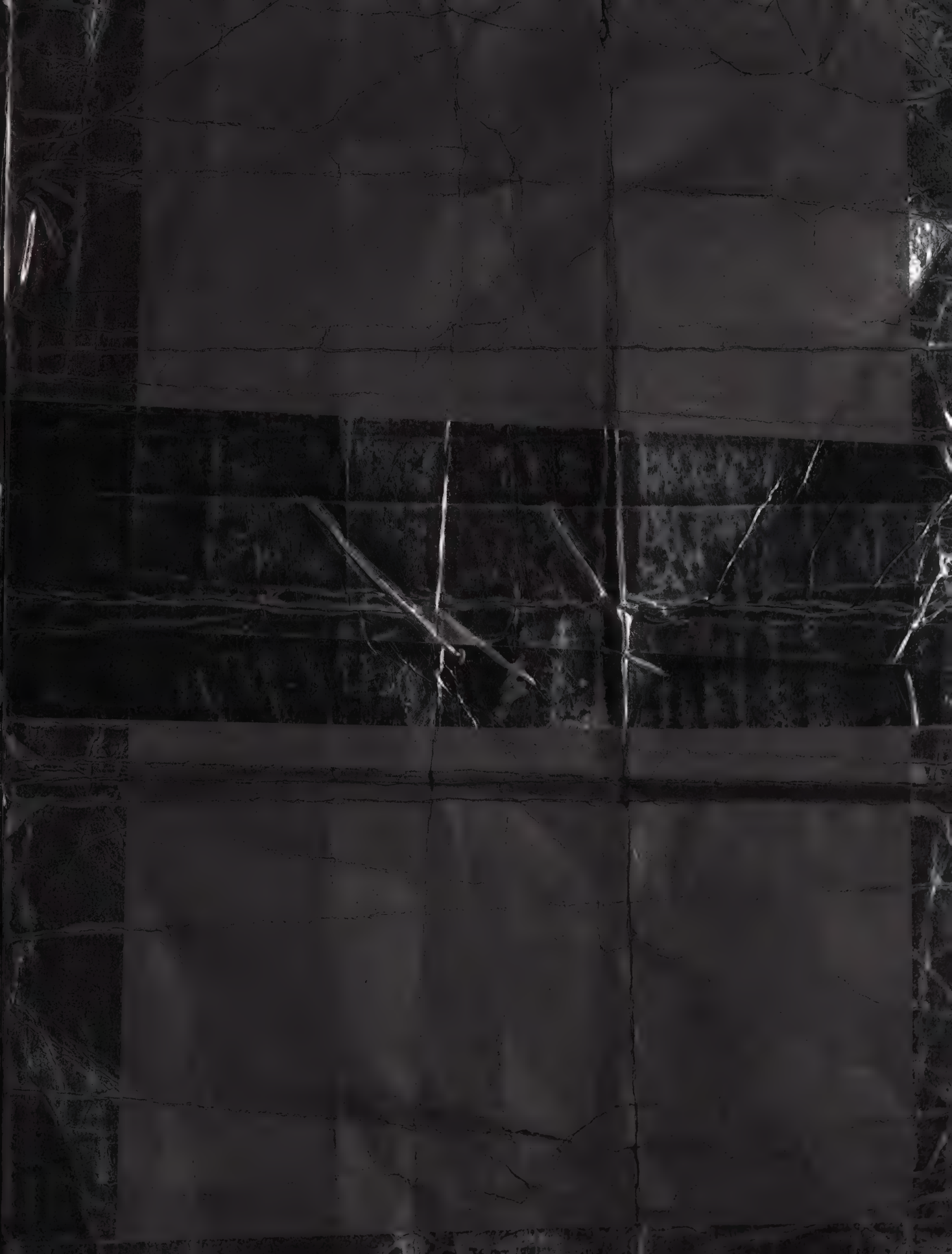
TONE "PRIVATE-LINE" ENCODER/DECODER

MODEL TRN6904A

PARTS LIST

TRN6904A Tone-Coded "P
Encoder/Decoder

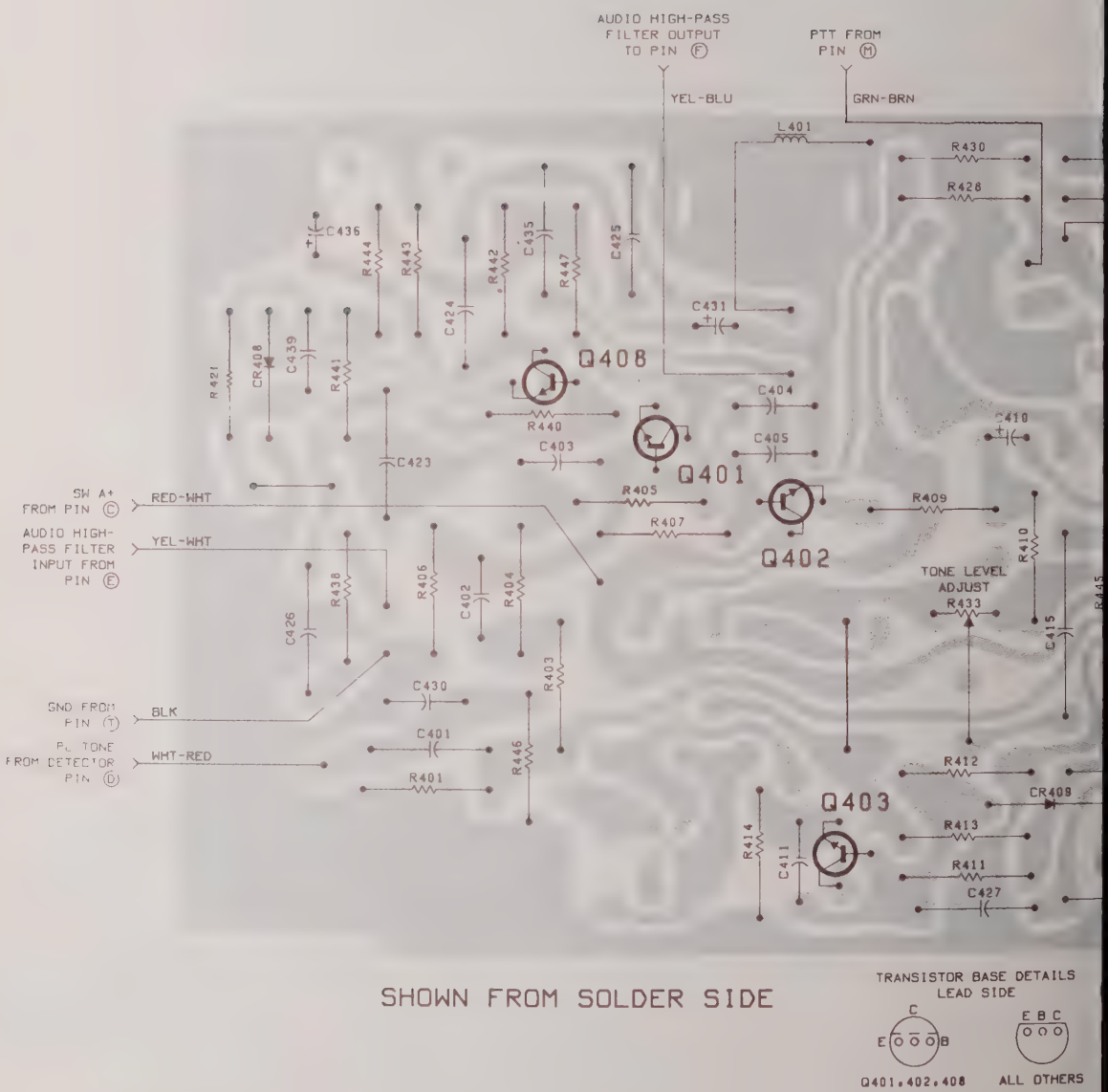
REFERENCE SYMBOL	MOTOROL PART NO
C401	21-82372C
C402, 403	21-82428B
C404	21-82428B
C405	21-82428B
C406	21-83596E
C407, 408	23-84665F
C409	21-82428B
C410	23-84665F
C411	21-83596E
C412, 413, 414	
C415	8-82096J2
C416	
C417	23-84665F
C418, 419	21-82428B
C420	21-83596E
C421	23-84665F
C422	21-83596E
C423, 424	8-84496D0
C425	8-82905G
C426	8-84496D0
C427	21-82372C
C428	23-84665F
C429	
C430	21-82428B
C431	23-84665F
C432, 433	
C434	8-83813H0
C435	8-84496D0
C436	23-84665F
C437	21-83596E
C438	
C439	21-82428B
C440	23-84665F
CR401	
CR402	48-83654H
CR403	
CR404	48-82178A
CR405	48-83654H
CR406	
CR407, 408, 409	48-83654H
L401	25-82498H
Q401, 402	48-134667
Q403 thru 406	48-869642
Q407	48-869643
Q408	48-134667
Q409	48-869642
R401, 402	6-124D02
R403, 404, 405	6-124A99
R406	6-124D02
R407	6-124A99
R408	6-124C49
R409	6-124C69
R410	6-124C63
R411	6-124A99
R412	6-124C85
R413	6-124C55
R414	6-124C37
R415	
R416	6-124C65
R417 thru 420	
R421	6-124C87
R422 thru 427	
R428	6-124C49
R429	6-124C83
R430	6-124C33
R431	6-124C61
R432	6-124C57



	DESCRIPTION
	rivate-Line'
	PL-5334-O
	CAPACITOR, fixed: uF ±10%; 100 V; unless otherwise stated
01	0.1 +80-20%; 25 V
59	.01 +80-20%; 200 V
23	.0012
59	.01 +80-20%; 200 V
10	220 pF ±20%; 500 V
01	10 +100-0%; 25 V
09	.0047
01	10 +100-0%; 25 V
10	220 pF ±20%; 500 V
	NOT USED
0	0.22
	NOT USED
04	1 +150-0%; 50 V
09	.0047
10	220 pF ±20%; 500 V
01	10 +100-0%; 25 V
10	220 pF ±20%; 500 V
4	.047 ±20%; 100 V
1	0.15; 50 V
4	.047 ±20%; 100 V
01	0.1 +80-20%; 25 V
01	10 +100-0%; 25 V
	NOT USED
59	.01 +80-20%; 200 V
04	1 +150-0%; 50 V
	NOT USED
1	.0068
4	.047 ±20%; 100 V
01	10 +100-0%; 25 V
10	220 pF ±20%; 500 V
	NOT USED
28	.002
04	1 +150-0%; 50 V
	DIODE: (SEE NOTE)
	NOT USED
01	silicon
	NOT USED
06	germanium
01	silicon
	NOT USED
01	silicon
	COIL:
02	6 H
	TRANSISTOR: (SEE NOTE)
	NPN; type M54
	NPN; type M9642
	PNP; type M9643
	NPN; type M54
	NPN; type M9642
	RESISTOR, fixed: ±10%; 1/4 W; unless otherwise stated
	150k
	120k ±5%
	150k
	120k ±5%
	1k
	6.8k
	3.9k
	120k ±5%
	33k
	1.8k
	330
	NOT USED
	4.7k
	NOT USED
	22k
	NOT USED
	1k
	27k
	220
	3.3k
	2.2k

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R433	18-84944C02	variable; 25k
R434	6-124C53	1.5k
R435	6-124C87	22k
R436	6-124C45	680
R437	6-124C97	100k
R438	6-124C73	10k
R439		NOT USED
R440	6-124D02	150k
R441	6-124C89	47k
R442	6-124C97	100k
R443, 444	6-124C73	10k
R445	6-124C77	15k
R446	6-124C85	33k
R447	6-124C49	1k
R448	6-124C97	100k
R449		NOT USED
		THERMISTOR:
RT401	6-82990E18	190 ohms
		INTEGRATED CIRCUIT: (SEE NOTE)
U401	51-84267A04	type 67A04
		DIODE: (SEE NOTE)
VR401	48-82256C25	Zener type; 12 V
	NON-REFERENCED ITEMS	
	TLN6709B	"VIBRASPONDER", resonant reed
	42-84116B02	SOCKET, "Vibrasponder"
	39-10184A10	CONTACT, push-pin; male
	39-10184A24	CONTACT, push-pin; female
	29-84706E06	PIN, female; molex

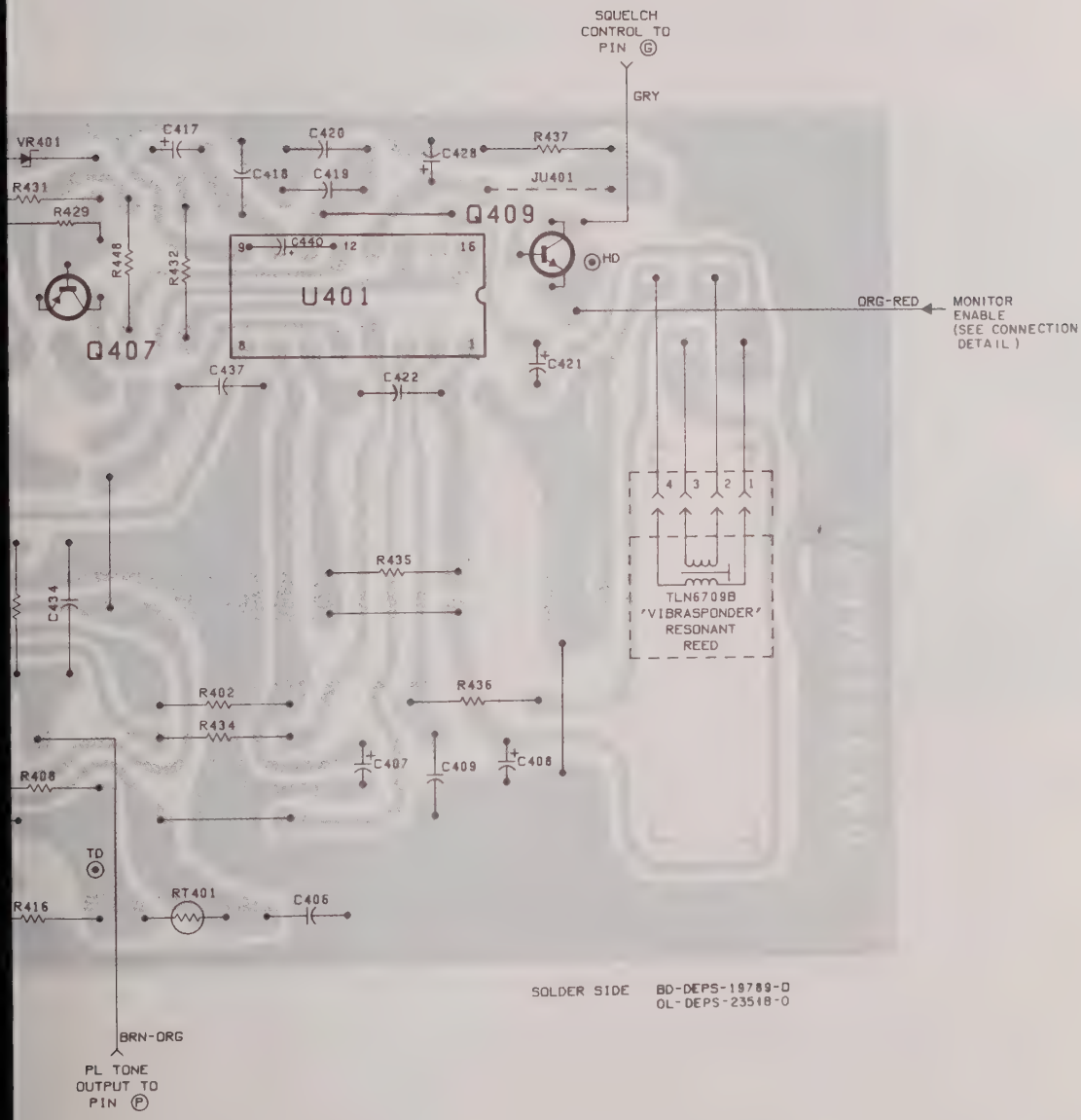
NOTE: For optimum performance, replacement diodes, transistors, and integrated circuits must be ordered by Motorola part number.



SHOWN FROM SOLDER SIDE

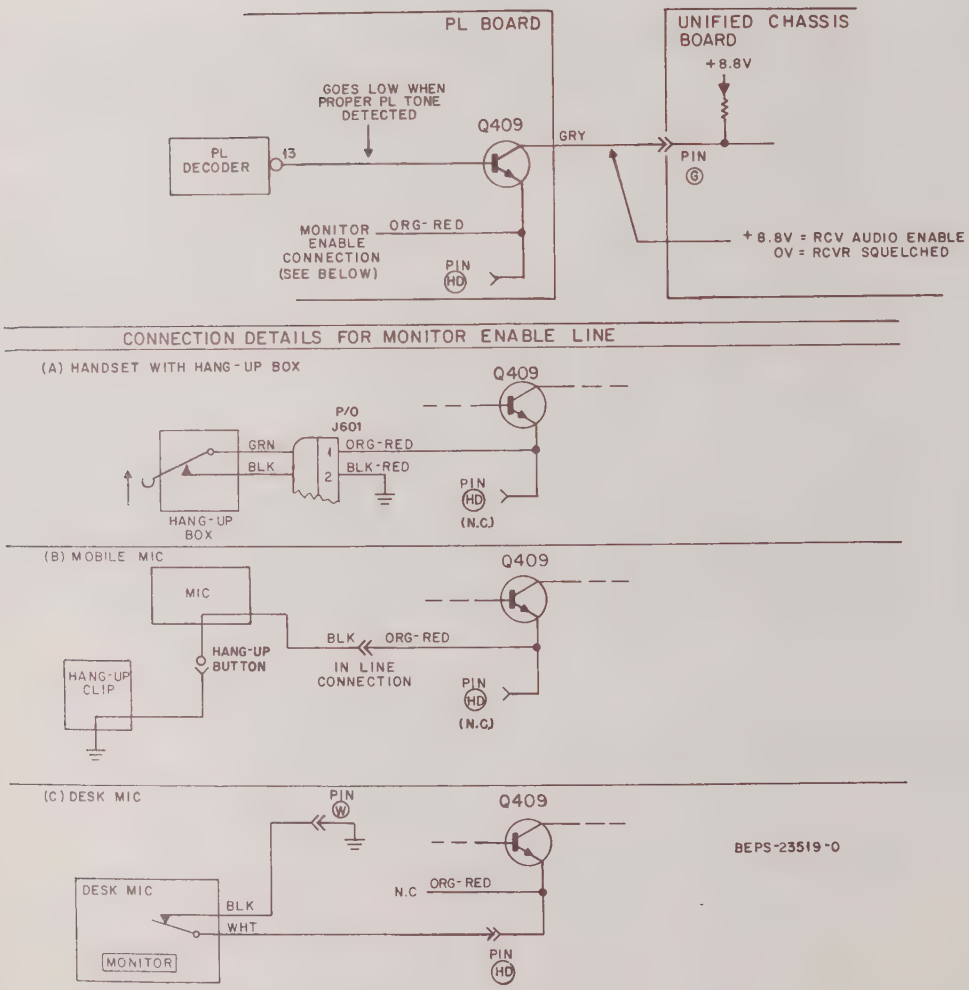
TRANSISTOR BASE DETAILS
LEAD SIDE

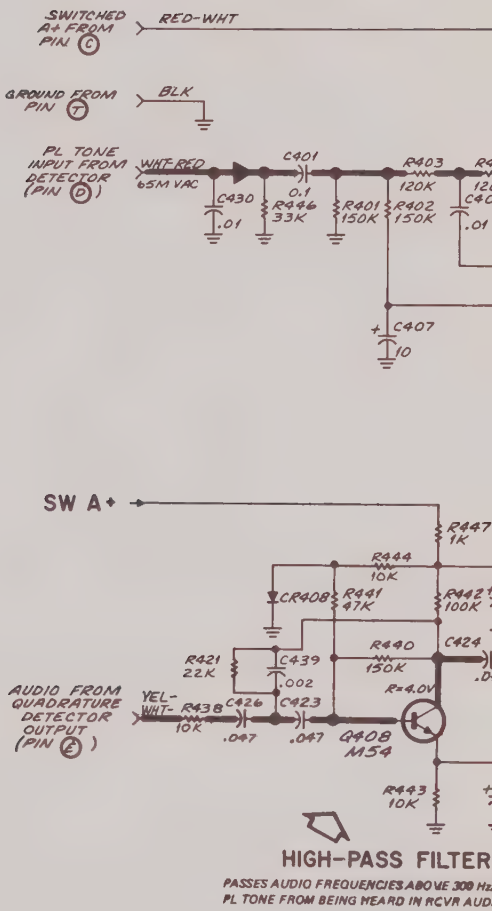
Q401, 402, 408 ALL OTHERS



SOLDER SIDE BD-DEPS-19789-D
OL-DEPS-23548-O

MONITOR ENABLE CONNECTION DETAIL





HIGH-PASS FILTER

PASSES AUDIO FREQUENCIES ABOVE 300 Hz
PL TONE FROM BEING HEARD IN RCVR AUD

HANDLING PRECAUTIONS FOR CMOS INTEGRATED CIRCUITS

Many of the integrated circuit devices used in communications equipment are of the CMOS (Complementary Metal Oxide Semiconductor) type. Because of their high open circuit impedance, CMOS ICs are vulnerable to damage from static charges. Care must be taken in handling, shipping, and servicing them and the assemblies in which they are used.

Even though protection devices are provided in CMOS IC inputs, the protection is effective only against overvoltage in the hundreds of volts range such as are encountered in an operating system. In a system, circuit elements distribute static charges and load the CMOS circuits, decreasing the chance of damage. *However, CMOS circuits can be damaged by improper handling of the modules even in a system.*

To avoid damage to circuits, observe the following handling, shipping, and servicing precautions:

(1) Prior to and while servicing a circuit module, particulary after moving within the service area, momentarily touch *both* hands to a bare metal earth grounded surface. This will discharge any static charge which may have accumulated on the person doing the servicing.

(2) Whenever possible avoid touching any electrically conductive parts of the circuit module with your hands.

(3) Normally, circuit modules can be inserted or removed with power applied to the unit. However, check the INSTALLATION and MAINTENANCE sections of the manual as well as the module schematic diagram to insure there are no objections to this practice.

(4) When servicing a circuit module, avoid carpeted areas, dry environments, and certain types of clothing (silk, nylon, etc.) because they contribute to static buildup.

(5) All electrically powered test equipment should be grounded. *Apply* the *ground lead* from the test equipment to the circuit module *before* connecting the *test probe*. Similarly, disconnect the *test probe prior* to removing the *ground lead*.

(6) If a circuit module is removed from the system, it is desirable to lay it on a conductive surface (such as a sheet of aluminum foil) which is connected to ground through a resistance of approximately 100k.

WARNING

If the aluminum foil is connected directly to ground, be cautious of possible electrical shock from touching the foil while working with other electrical circuits.

(7) When soldering, be sure the soldering iron is grounded.

(8) Prior to connecting jumpers, replacing circuit components, or touching CMOS pins (if this becomes necessary in the replacement of an integrated circuit device), be sure to discharge any static buildup as described in procedure 1. Since voltage differences can exist across the human body, it is recommended that only one hand be used if it is necessary to touch pins on the CMOS device and associated board wiring.

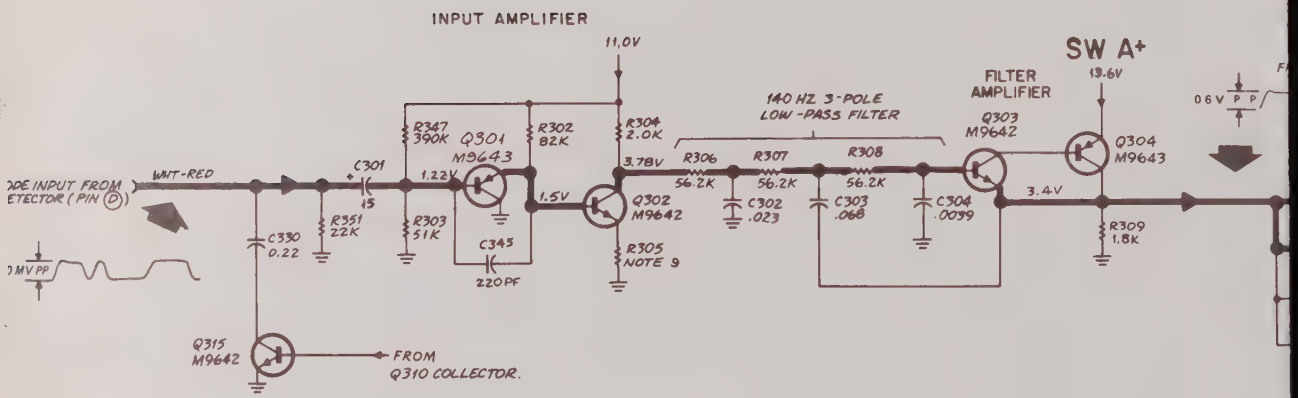
(9) When replacing a CMOS integrated circuit device, leave the device in its metal rail container or conductive foam until it is to be inserted into the printed circuit module.

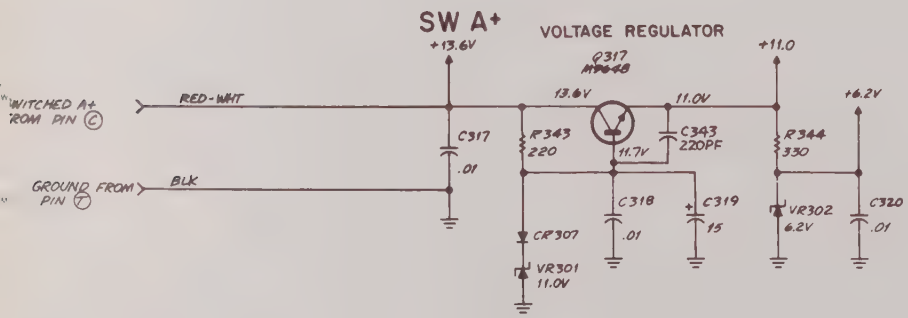
(10) All low impedance test equipment (such as pulse generators, etc.) should be connected to CMOS device inputs after power is applied to the CMOS circuitry. Similarly, such low impedance equipment should be disconnected before power is turned off.

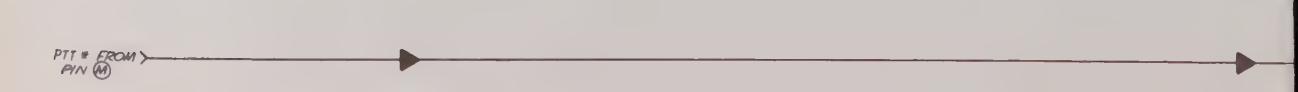
(11) Replacement modules shipped separately from the factory will be packaged in a conductive material. Any modules being transported from one area to another should be wrapped in a similar material (aluminum foil may be used). NEVER USE NONCONDUCTIVE MATERIAL for packaging these modules.

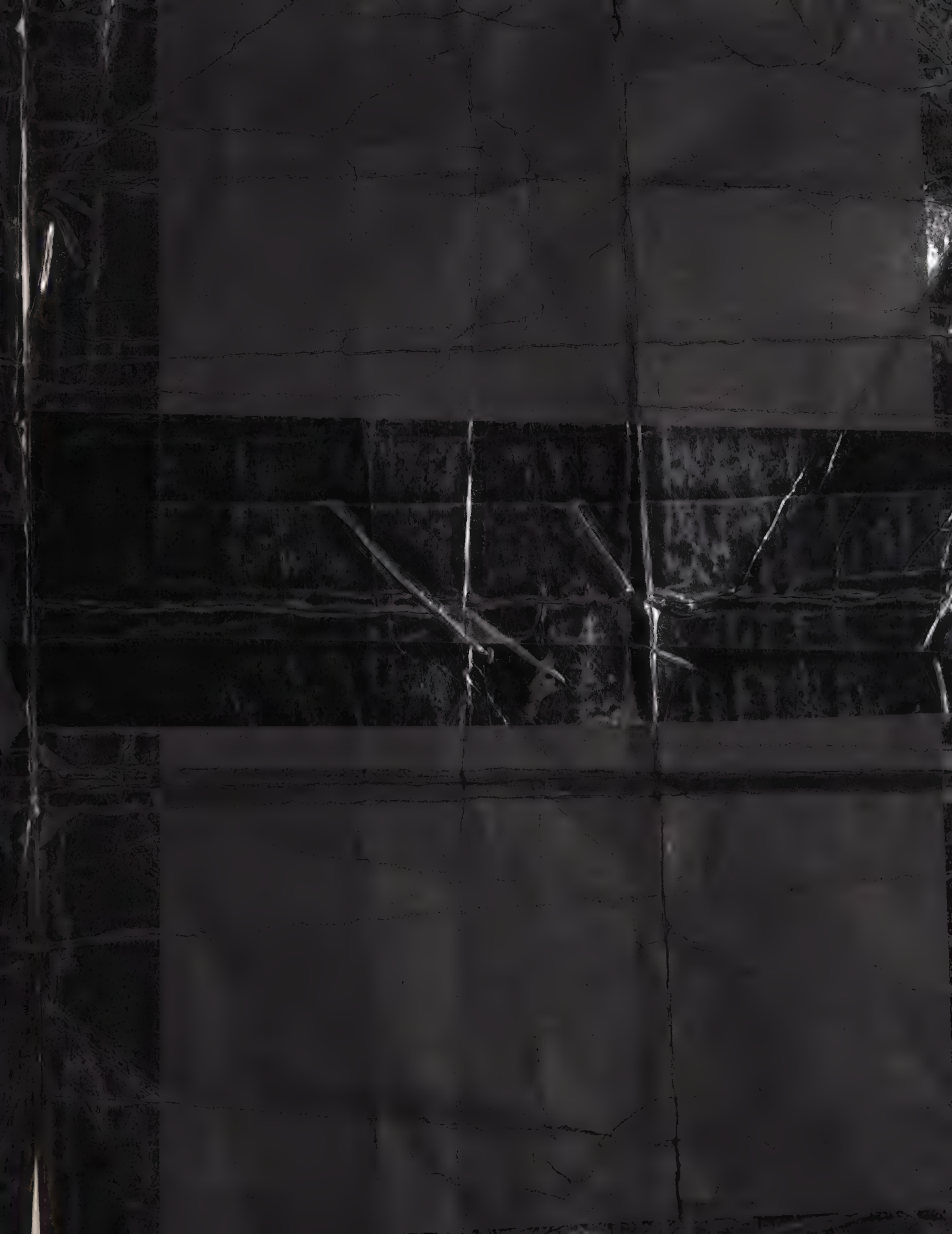
NOTES:

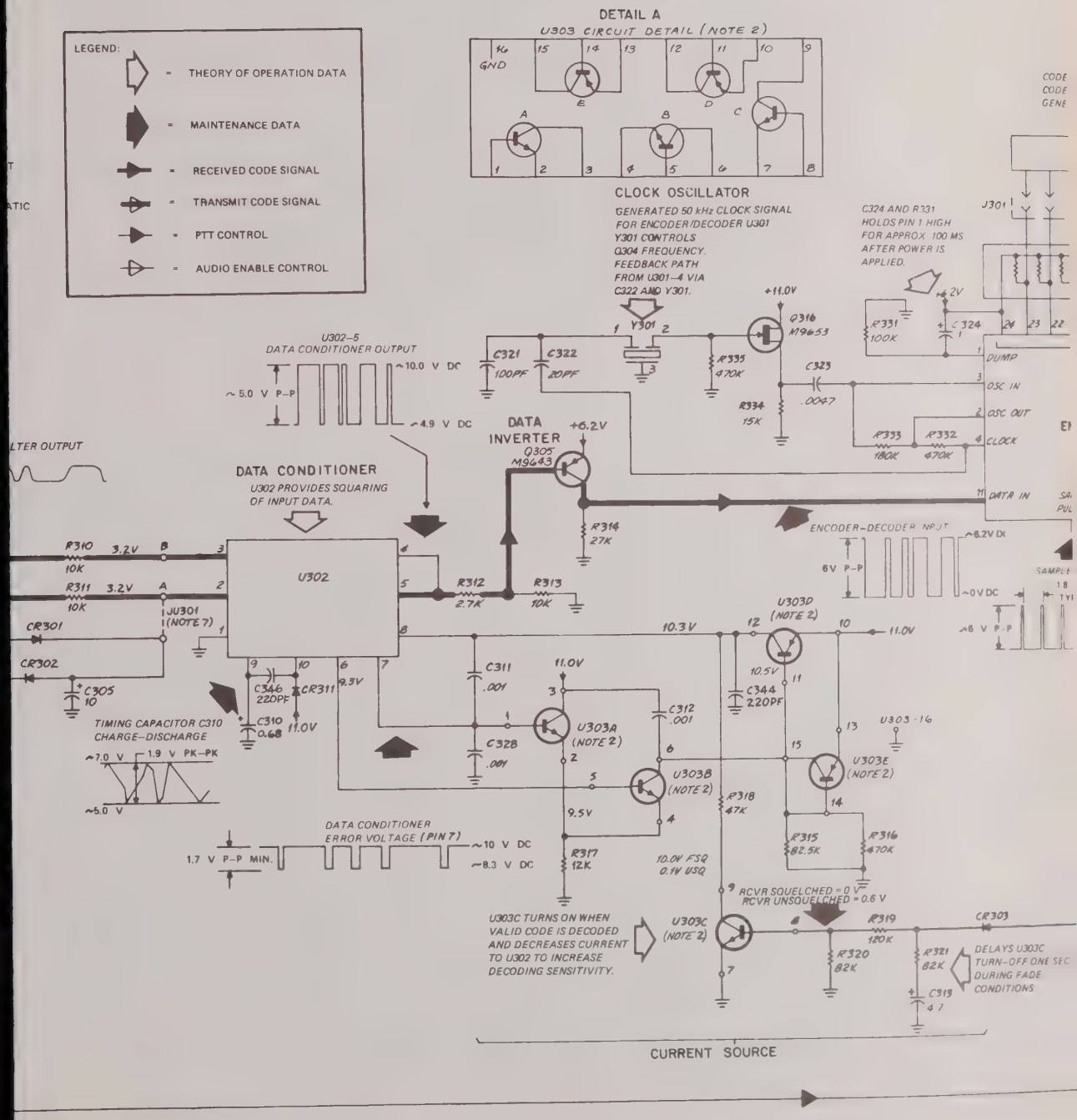
1. UNLESS OTHERWISE INDICATED: RESISTOR VALUES ARE IN OHMS; CAPACITOR VALUES ARE IN MICROFARADS.
2. TRANSISTORS IN CURRENT SOURCE CIRCUIT ARE PART OF U303. SEE DETAIL A.
3. WAVEFORMS ARE TAKEN WITH AN ON CHANNEL RF SIGNAL OF 1000 uV. AT ANTENNA CONNECTOR, MODULATED WITH 1000 Hz AND A DIGITALLY CODED SQUELCH SIGNAL AT ±5 kHz DEVIATION.
4. DC VOLTAGES MEASURED WITH A HIGH IMPEDANCE MULTIMETER (11 MEGOHM INPUT IMPEDANCE). VOLTAGES IN PARENTHESES ARE FOR RECEIVE MODE.
5. U301 IS A CMOS DEVICE. REFER TO THE HANDLING PRECAUTIONS ON THE BACK OF THIS PAGE.
6. TO OBTAIN ACCURATE MEASUREMENT OF TRANSMITTER DEVIATION IN RADIOS EQUIPPED WITH "DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH, THE FREQUENCY RESPONSE OF THE DEVIATION MEASURING EQUIPMENT MUST BE < 1 Hz. DETAILED INSTRUCTIONS ON DEVIATION ADJUSTMENT ARE PROVIDED IN THE TRANSMITTER ALIGNMENT SECTION OF THIS MANUAL.
7. JU301 IS NORMALLY CONNECTED TO POINT A. CONNEC JU301 TO POINT B TO DECODE INVERTED CODES.
8. THE CODE DISABLE POINTS INDICATED ON THE SCHEM DIAGRAM (U301 OUTPUT LINE) ARE CIRCUIT BOARD PLATING PADS. THESE PADS ARE SHORTED TOGETHER TO DISABLE THE DIGITAL PL CODE WHEN SETTING TRANSMITTER FREQUENCY AND AT TIMES WHEN SETTING MODULATION DEVIATION.
9. RESISTOR R305 FACTORY SELECTED.

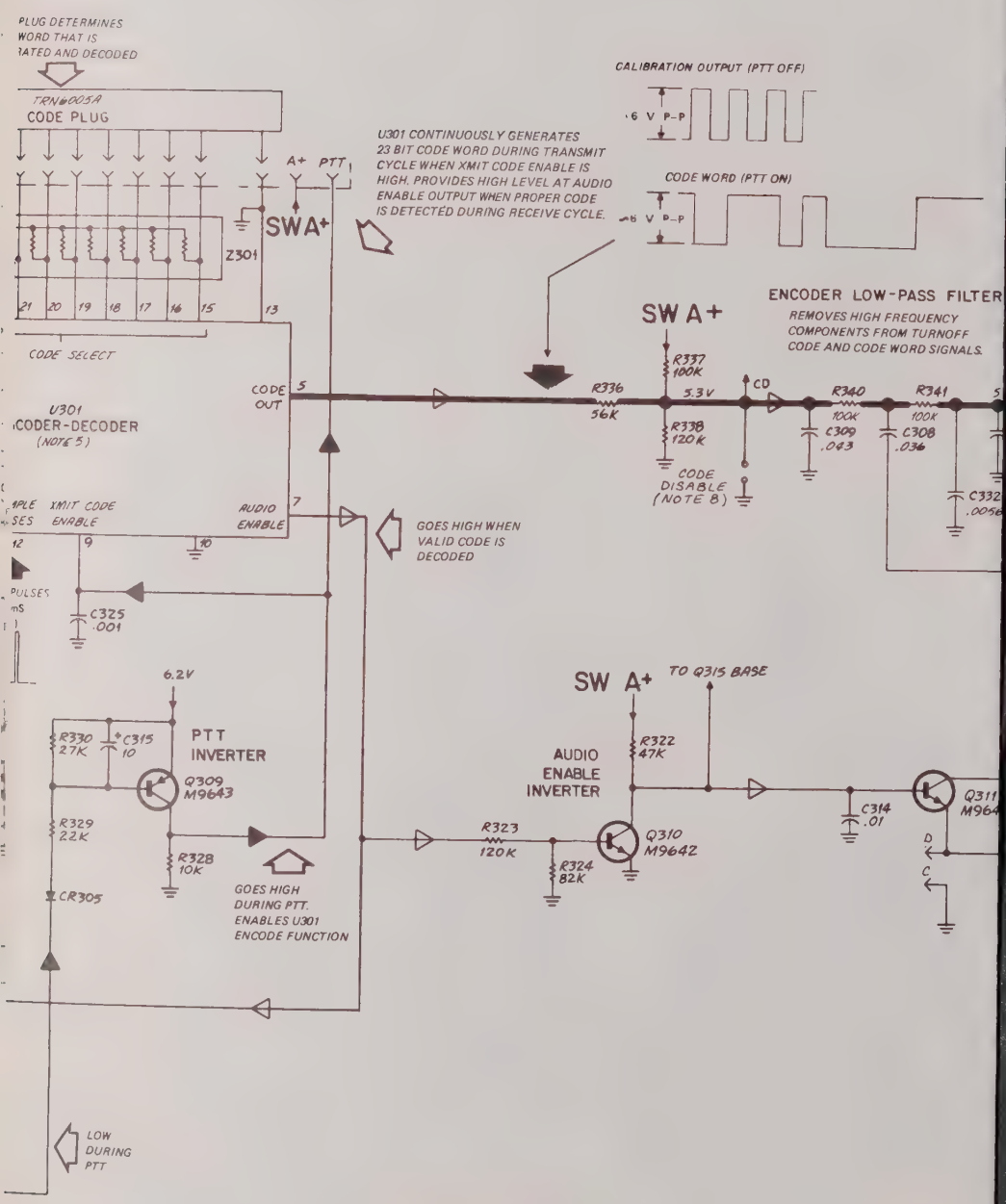


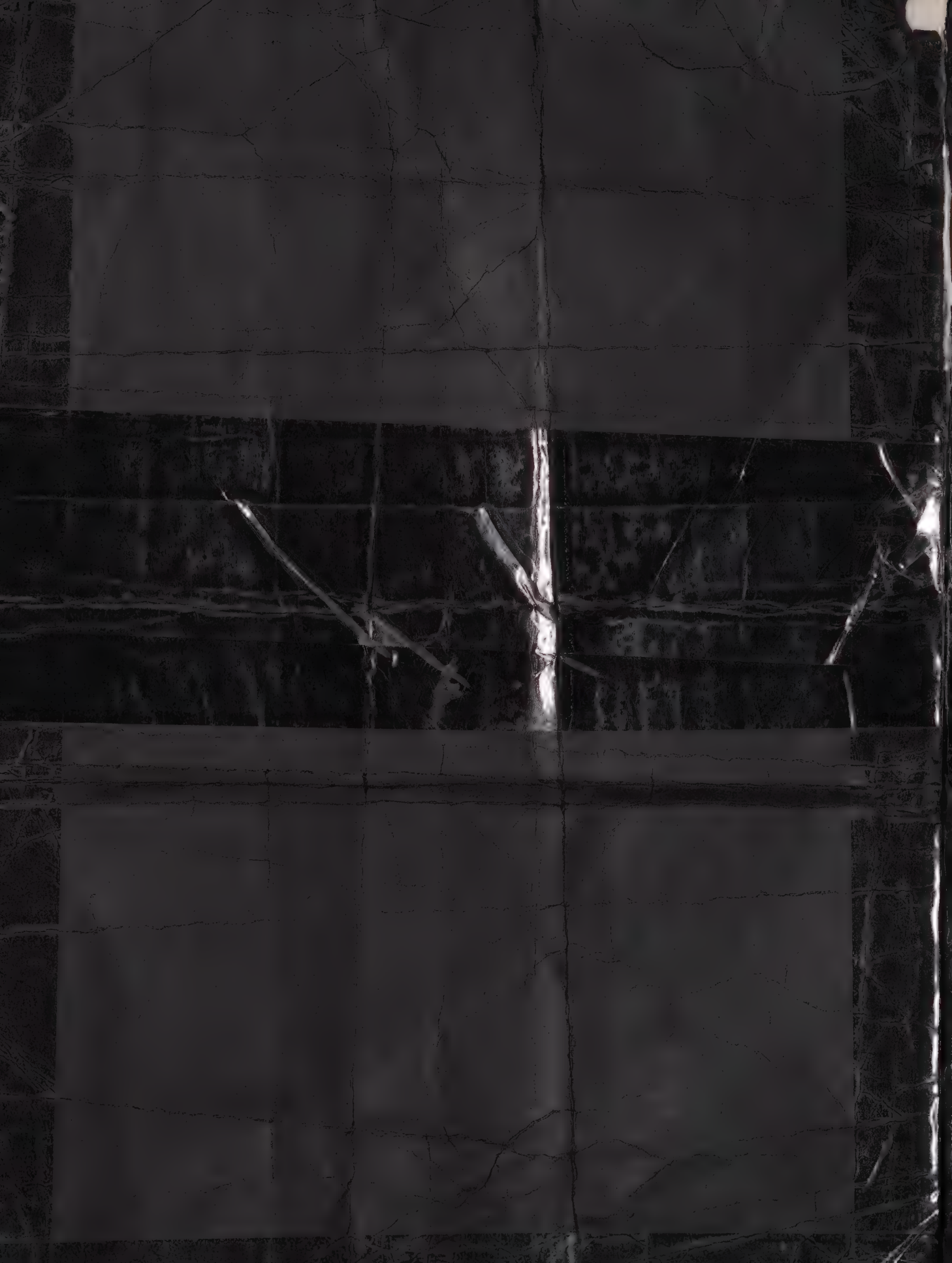







LEGEND:
= THEORY OF OPERATION DATA
= MAINTENANCE DATA
= RECEIVED CODE SIGNAL
= TRANSMIT CODE SIGNAL
= PTT CONTROL
= AUDIO ENABLE CONTROL
DETAIL A
U303 CIRCUIT DETAIL (NOTE 2)
GND
CLOCK OSCILLATOR
GENERATED 50 kHz CLOCK SIGNAL FOR ENCODER/DECODER U301
Y301 CONTROLS Q304 FREQUENCY.
FEEDBACK PATH FROM U301—4 VIA C322 AND Y301.
C324 AND R331 HOLDS PIN 1 HIGH FOR APPROX 100 MS AFTER POWER IS APPLIED.
+11.0V
Q316 M9653
Y301
C321 100PF
C322 20PF
R335 470K
C323 .0047
R334 15K
R331 100K
C324
DUMP
OSC IN
OSC OUT
CLOCK
DATA IN
U302—5
DATA CONDITIONER OUTPUT
~10.0 V DC
~5.0 V P-P
~4.9 V DC
DATA INVERTER
Q305 M9643
+6.2V
R333 180K
R332 470K
R314 27K
DATA CONDITIONER
U302 PROVIDES SQUARING OF INPUT DATA.
U302
R310 10K 3.2V
R311 10K 3.2V
R312 2.7K
R313 10K
JU301 (NOTE 7)
CR301
CR302
C305 10
C346 220PF
CR311
C310 0.68
11.0V
9.3V
TIMING CAPACITOR C310 CHARGE—DISCHARGE
~7.0 V
1.9 V PK—PK
~5.0 V
C311 .001
C328 .001
U303A (NOTE 2)
C312 .001
U303B (NOTE 2)
U303D (NOTE 2)
10.3V
10.5V
C344 220PF
11.0V
U303E (NOTE 2)
R318 47K
R315 82.5K
R316 470K
9.5V
DATA CONDITIONER ERROR VOLTAGE (PIN 7)
1.7 V P-P MIN.
~10 V DC
~8.3 V DC
R317 12K
10.0V FSQ
0.1V USQ
RCVR SQUELCHED = 0 V
RCVR UNSQUELCHED = 0.6 V
U303C TURNS ON WHEN VALID CODE IS DECODED AND DECREASES CURRENT TO U302 TO INCREASE DECODING SENSITIVITY.
U303C (NOTE 2)
R319 120K
R320 82K
R321 82K
C313 4.7
CR303
DELAYS U303C TURN-OFF ONE SEC DURING FADE CONDITIONS
CURRENT SOURCE
ENCODER-DECODER INPUT
~8.2V DC
6V P-P
~0V DC
~6 V P-P


PLUG DETERMINES
WORD THAT IS
RATED AND DECODED
TRN6005A
CODE PLUG
A+
PTT
SWA+
Z301
21 20 19 18 17 16 15
13
CODE SELECT
U301
CODER-DECODER
(NOTE 5)
CODE
OUT
5
AUDIO
ENABLE
7
12
9
10
U300 CODE
ENABLE
GOES HIGH WHEN
VALID CODE IS
DECODED
C325
.001
6.2V
R330
27K
C315
10
PTT
INVERTER
Q309
M9643
R329
22K
R328
10K
CR305
GOES HIGH
DURING PTT.
ENABLES U301
ENCODE FUNCTION
LOW
DURING
PTT
U301 CONTINUOUSLY GENERATES
23 BIT CODE WORD DURING TRANSMIT
CYCLE WHEN XMIT CODE ENABLE IS
HIGH. PROVIDES HIGH LEVEL AT AUDIO
ENABLE OUTPUT WHEN PROPER CODE
IS DETECTED DURING RECEIVE CYCLE.
CALIBRATION OUTPUT (PTT OFF)
.6 V P-P
CODE WORD (PTT ON)
.6 V P-P
SW A+
R337
100K
3.3V
R336
56K
R338
120K
CODE
DISABLE
(NOTE 8)
CD
ENCODER LOW-PASS FILTER
REMOVES HIGH FREQUENCY
COMPONENTS FROM TURNOFF
CODE AND CODE WORD SIGNALS.
R340
100K
C309
.043
R341
100K
C308
.036
C332
.0056
SW A+
TO Q315 BASE
AUDIO
ENABLE
INVERTER
R322
47K
R323
120K
Q310
M9642
R324
82K
C314
.01
Q311
M964
D
C

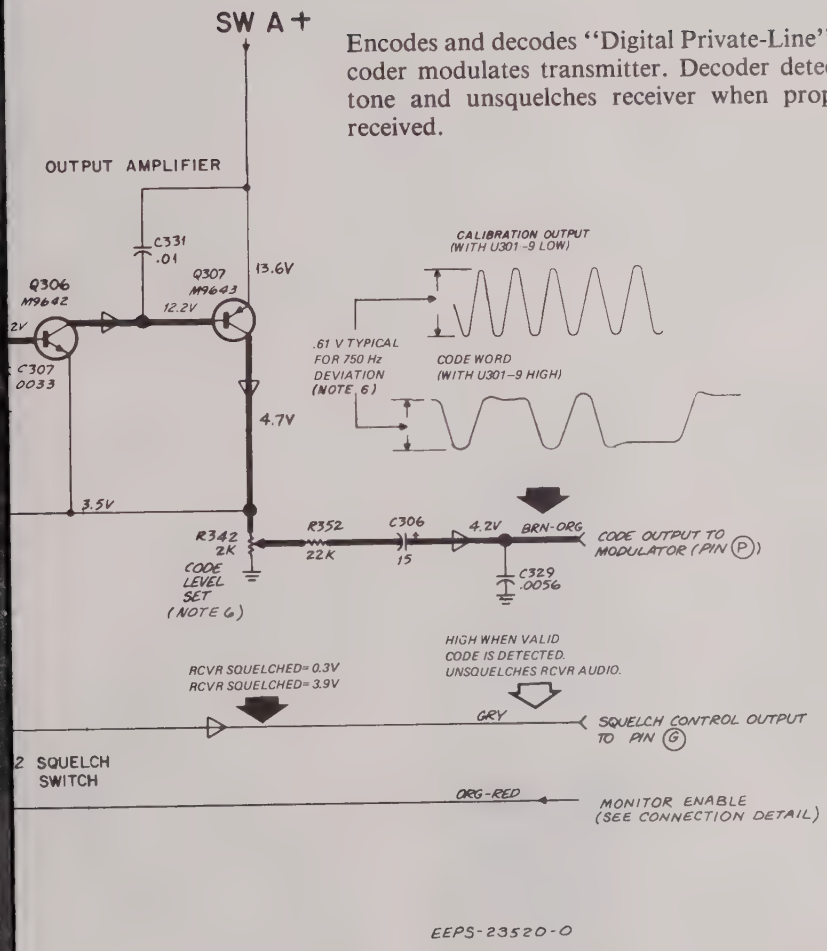


"DIGITAL PRIVATE-LINE" ENCODER/DECODER

MODEL TRN6906A

FUNCTION

Encodes and decodes "Digital Private-Line" codes. Encoder modulates transmitter. Decoder detects received tone and unsquelches receiver when proper code is received.



EEPS-23520-O

"DIGITAL PRIVATE-LINE" ENCODER & DECODER/DESK MICROPHONES

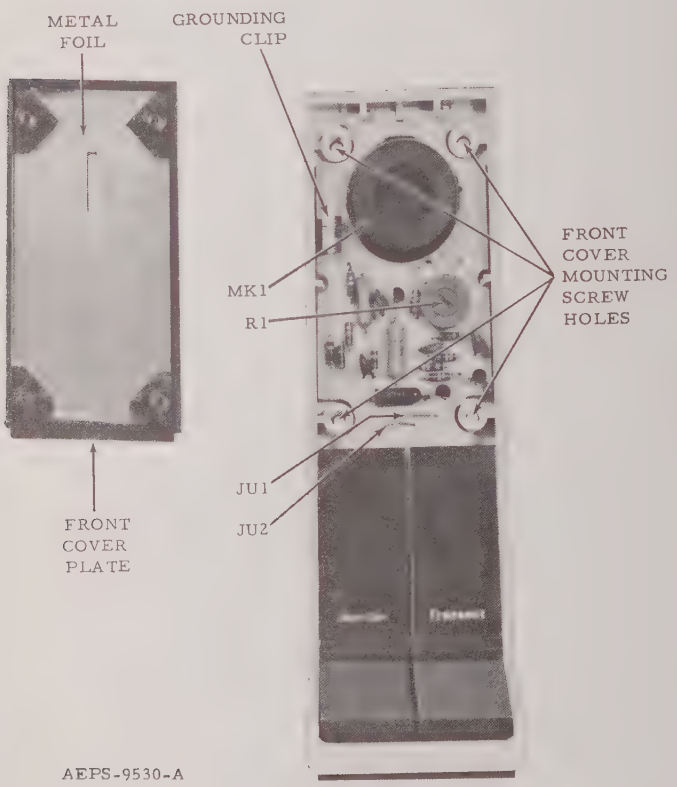
68P81034E53-A
(Sheet 2 of 2)
6/27/77-NPC

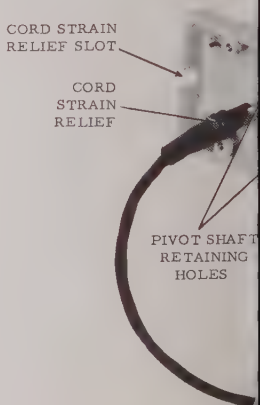
DESK MICROPHONES

MODELS TMN1008A-TMN1011A & TMN1018A

FUNCTION

The desk microphones provide a desk surface self-supporting stand to mount the PTT and PL monitor switches and to support the dynamic cartioid microphone element at mouth level. The TMN1008A and TMN1010A are used in "Private-Line" squelch systems and provide both PTT and monitor switches; the TMN1009A and TMN1011A are used with carrier squelch systems and use only the PTT switch. The TMN1018A is used in paging applications and includes both PTT and monitor switches.

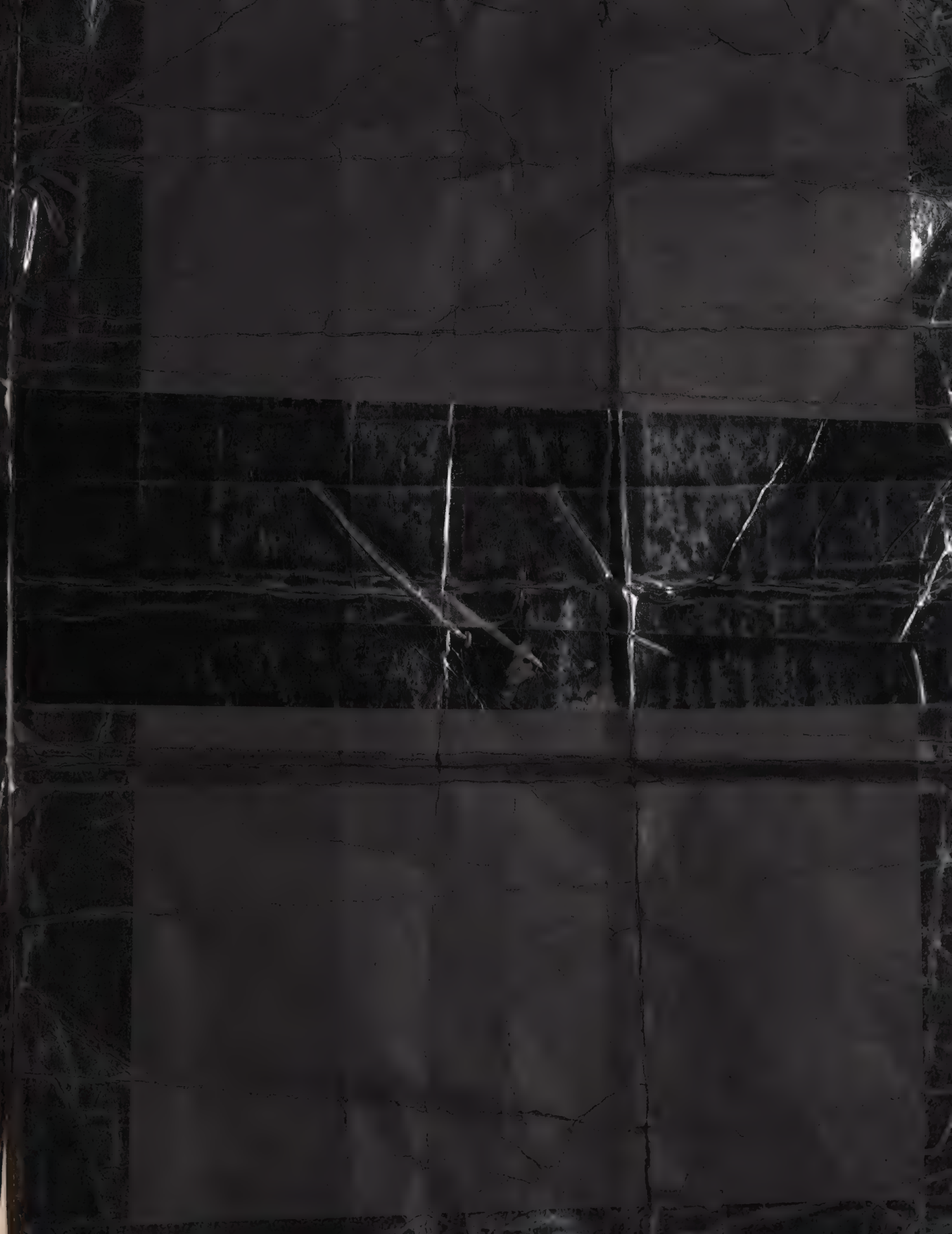




REFERENCE SYMBOL	MOTO PAR
PARTS LIST	
TRN6029A & TLN49	
C1	21-82
C2	8-82
C3	21-8
C4	23-8
C5	21-8
C6	8-82
C7	21-8
MK1	59-8
Q1	48-8
Q2, 3	48-8
R1	18-8
R2	6-12
R3	6-12
R4	6-12
R5	6-12
R7	6-12
R8	6-13
R9	6-12
R11	6-12
NO	
	5-84
	42-8

68P81030E06-E
6/27/77- NPC

MICROPHONE DETAIL



OROLA T NO.	DESCRIPTION
	25A Microphone Circuit Board PL-3510-O
	CAPACITOR, fixed: uF ±10%
2187B08	220 pF; 500 V
2187E11	.022; 80 V
2187B44	.001; 100 V
2762H09	15; ±20%; 20 V
2187B44	.001; 100 V
2187E02	.047; 200 V
2187B45	470 pF; 500 V
	CARTRIDGE, microphone:
2640E01	miniature
	TRANSISTOR: (SEE NOTE)
29571	PNP; type M9571
29594	NPN; type M9594
	RESISTOR, fixed: ±10%; 1/4 W; unl. stated
2083G34	variable; 1.5 meg ±30%
2226	100k
2805	15k
2B14	470k ±5%
2668	10k ±5%
2707	2.7k ±5%
2858	270k ±5%
2231	3.3k
2753	100
	N-REFERENCED ITEMS
2771E01	GROMMET, cartridge
2724E01	CLIP, grounding

AEPS-9528-O

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION

PARTS LIST

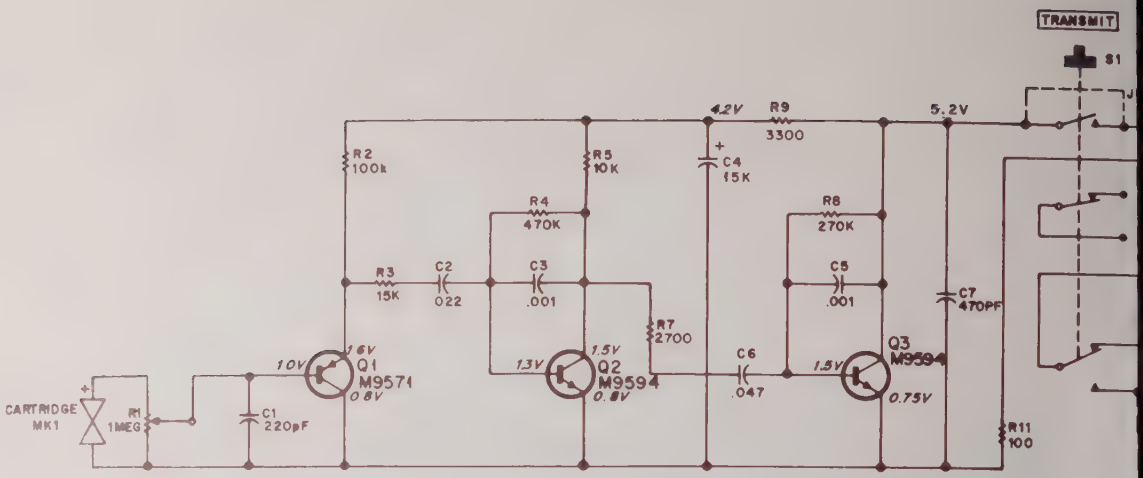
THN6254A (PL), & THN6255A (Carrier squelch)
THN6320A (Paging)
Microphone Housing & Hardware Kit PL-35

S1, 2	40-84711E03	SWITCH, leaf: assembly S1 has 1 form A 1 form B and 1 form C, S2 1 form A and 1 form B (THN6254A and THN6320A)
S1	40-84711E02	assembly includes 1 form and 1 form B (THN6255A
		NON-REFERENCED ITEMS
	3-136676	SCREW, switch mtg. 4-40 1/4 pnl hex
	1-80779B59	CABLE ASSEMBLY include connector, 28-83372F02
	15-84186E01	COVER, front
	15-84188E01	COVER, rear
	15-84191E01	HOUSING
	26-84720E01	FOIL, grounding, front cov
	26-84721E01	FOIL, grounding, rear cov
	38-84184E02	BUTTON, left hand (THN61
	38-84184E01	BUTTON, left hand (THN61
	38-84192E01	BUTTON, right hand
	42-84725E01	CLIP, retainer
	47-84193E01	SHAFT
	47-84194E01	SHAFT EXTENSION
	47-84723E01	SHAFT COUPLING (THN61 only)
	22-82591C05	PIN, roll (THN6154A only)
	64-84183E01	PLATE, base
	75-84722E01	PAD, base plate
	3-138809	BASE PLATE SCREW 4-40 5/16 phl bn hx bk ox
	3-138810	FRONT COVER SCREW 4-40 5/8 phl bn hx bk ox
	4-10058B10	WASHER ('TEFLON')

THN6252A (PL) & THN6253A (Carrier Squelch)
Microphone Housing & Hardware Kit PL-35

S1, 2	40-84711E03	SWITCH, leaf: assembly S1 has 1 form 1 form B and 1 form C, S 1 form A and 1 form B (THN625-A
S1	40-84711E02	assembly includes 1 for 1 form B and 1 form (THN6253A)
		NON-REFERENCED ITEMS
	3-136676	SCREW, switch mtg. 4- 1/4 pnl hex
	1-80780B29	CABLE ASSEMBLY in 30-10184A24 1
	15-84186E01	COVER, front
	15-84188E01	COVER, rear
	15-84191E01	HOUSING
	26-84720E01	FOIL, grounding, front
	26-84721E01	FOIL, grounding, rear
	38-84184E02	BUTTON,
	38-84184E01	BUTTON,
	38-84192E01	BUTTON,
	42-84725E01	CLIP, shaft retainer
	47-84193E01	SHAFT, push
	47-84194E01	SHAFT EXTENSION
	47-84723E01	SHAFT COUPLING, THN only
	22-82591C05	PIN, roll
	64-84183E01	PLATE, base
	75-84722E01	PAD, base plate
	3-138809	BASE PLATE SCREW 4- 5/16 phl bn hx bk ox
	3-138810	FRONT COVER SCREW 4- 5/8 phl bn hx bk ox
	4-10058B10	WASHER

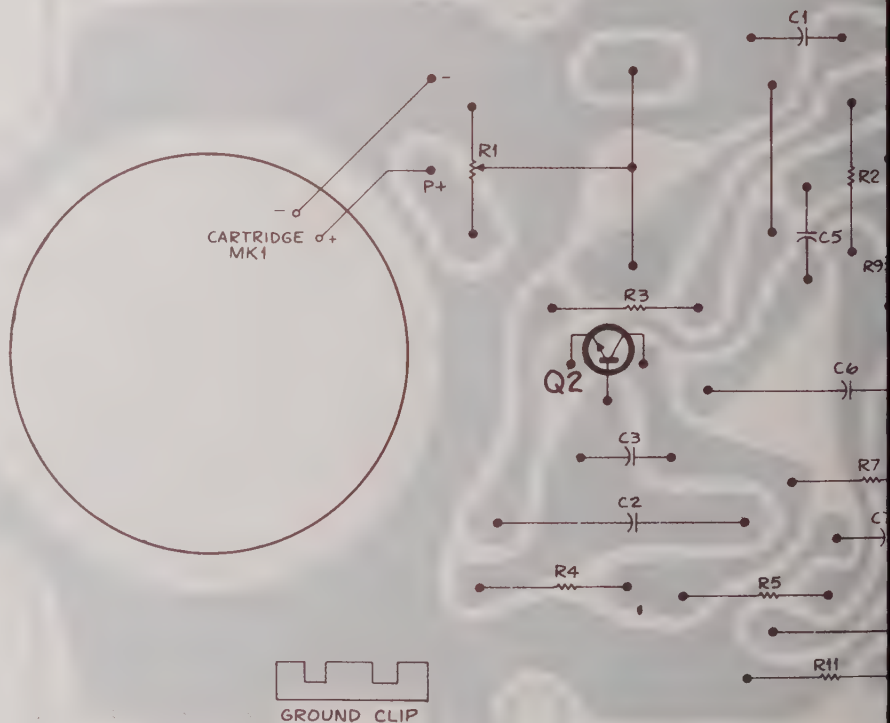
NOTE: Replacement transistors must be ordered by M part number only for optimum performance



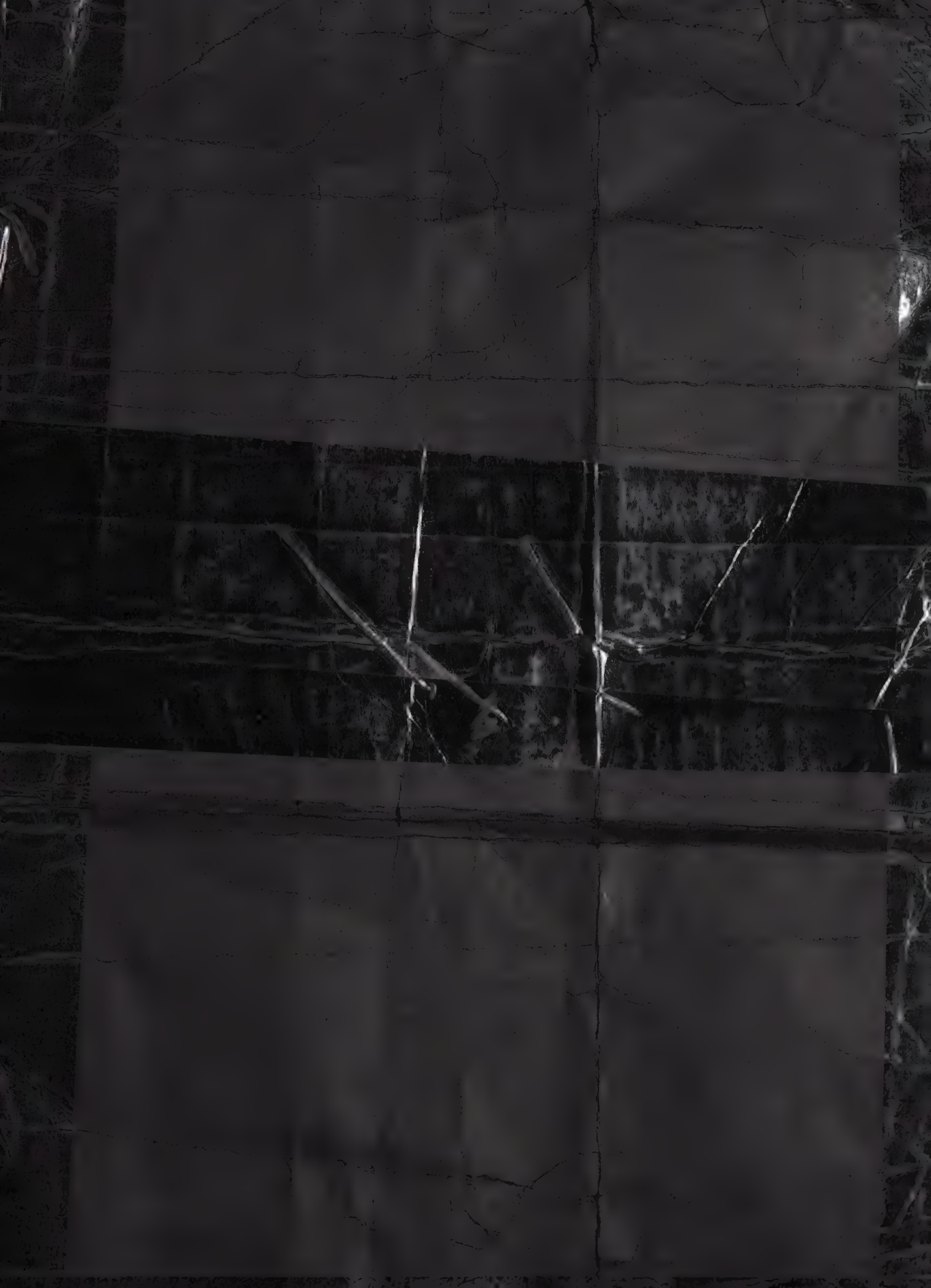
NOTES:

1. UNLESS OTHERWISE STATED:
   ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. REMOVE JU1 FOR PARALLEL MIC OPERATION.
3. JU2 IS NORMALLY REMOVED TO ENSURE THAT THE OPERATION MONITOR THE CHANNEL (FCC REQUIREMENT). IN THIS CASE BOTH THE MONITOR AND TRANSMIT BUTTONS MUST BE PRESSED TO TRANSMIT – RELEASING EITHER SWITCH ENDS THE TRANSMISSION.
4. ALL DC VOLTAGE READINGS ARE WITH RESPECT TO THE MIC LO LEAD.
5. MONITOR SWITCH S2 IS PRESENT IN MODEL TMN1008A & TMN1010A ONLY.

TMN1010A	TMN1011A	TMN1
1	1	
1	1	



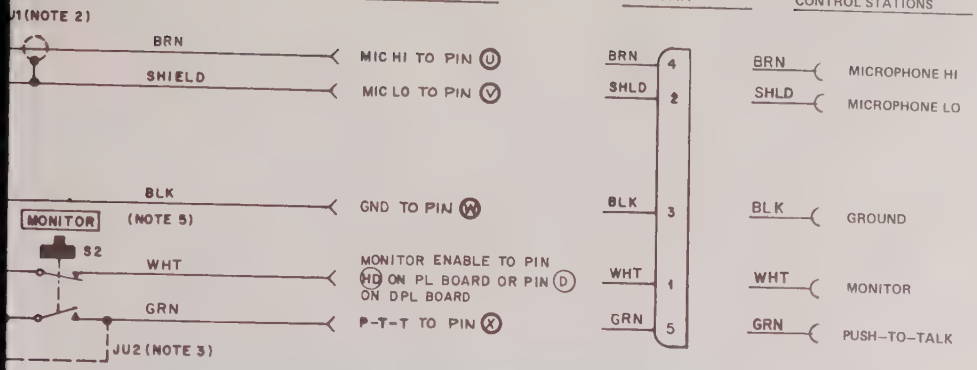
TRANSISTOR DETAIL



EXTERNAL CONNECTIONS FOR BASE STATION TMN1008A AND TMN1009A

CONNECTOR DETAIL FOR OLDER PAGING CONTROL STATION TMN1011A

EXTERNAL CONNECTIONS FOR NEW OR PAGING CONTROL STATIONS



DEPS-17648-E

DESK MICROPHONE MODEL COMPLEMENT

008A	TMN1009A	TMN1018A	DESCRIPTION	VERSION
	1		TLN4925A MICROPHONE CIRCUIT BOARD	2
		1	TRN6029A MICROPHONE CIRCUIT BOARD	0
			THN6252A MICROPHONE HOUSING AND HARDWARE KIT	0
	1		THN6253A MICROPHONE HOUSING AND HARDWARE KIT	0
			THN6254A MICROPHONE HOUSING AND HARDWARE KIT	0
			THN6255A MICROPHONE HOUSING AND HARDWARE KIT	0
		1	THN6320A MICROPHONE HOUSING AND HARDWARE KIT	0

SHOWN FROM COMPONENT SIDE

OL-DEPS-17641-A

BLK — GND TO PIN Ⓦ

WHT — MONITOR TO MONITOR PIN ON PL OR DPL BD

GRN — PTT TO PIN Ⓧ

BRN — MIC HI TO PIN Ⓤ

SHIELD — MIC LC TO PIN Ⓥ

MOTOROLA

MOXY
Two-Way FM Radio
150.8-174 MHz

Instruction Manual

68P81034E55-O

USER QUESTIONNAIRE

To the User of This Instruction Manual:

Motorola is engaged in a continuous program of improving its instruction literature. We believe that you can aid us in this program, so that we in turn can better help you service our equipment. To foster these aims, would you please answer the following questions:

First Fold

SCHEMATIC DIAGRAMS AND CABLING DIAGRAMS

First Fold

1. ☐ Are accurate and easy to follow
2. ☐ Contain minor errors
3. ☐ Contain major errors
4. ☐ Are difficult to follow

68P85901D80—J

If you have checked any box except 1, please tell us what schematic diagrams, or portions thereof, were at fault, or enter other comments.*

_____

_____

TEXT

1. ☐ Easy to follow — helps to service equipment
2. ☐ Would like more information on*

Second Fold _____ Second Fold

_____

3. ☐ Some instruction sections are too long or superfluous such as*

_____

_____

4. ☐ Other comments*

_____

_____

_____

(continued on reverse side)

PARTS LIST

1. ☐ Are complete and accurate
2. ☐ Would like more information as follows*

_____

_____

ILLUSTRATIONS IN GENERAL

1. ☐ Are complete and accurate
2. ☐ Want more illustrations such as*

_____

_____

3. ☐ Some are superfluous such as*

_____

_____

The name of my instruction manual is:

_____

The part number of my instruction manual is:

_____

(This number will be found on the cover or on the title page)

My name is _____

Company _____

Address _____

City _____ State _____ Zip _____

Date _____

Phone No. (include area code) _____

*Whenever possible, give complete model No. of equipment, and part No. of diagram or part No. of instruction section. This information is important.

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MOTOROLA, INC.
1301 E. Algonquin Road
Schaumburg, Illinois 60196

PLEASE STAPLE OR TAPE CLOSED BEFORE MAILING

To the User of this Manual:

Many servicemen have asked for smaller manuals with more servicing information on the schematic diagrams.

This manual uses a new approach which we feel fulfills this desire. The circuit descriptions and circuit maintenance data are now incorporated on the schematic diagram (or on a facing page).

First Fold

This new approach makes the manual smaller as well as easier to use because it puts the information at the serviceman's fingertips.

First Fold

We would appreciate hearing how you like the new approach after you have used the manual a few times. Please take a few minutes to give us your comments.

_____

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EPS–17831–B

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AVAILABLE BACKGROUND REFERENCE PUBLICATIONS

Three reference publications are available to provide background information needed to service some of the newer Motorola products more effectively. The information in these publications is not duplicated in our instruction manuals. To obtain your free copy, check the ones you want and return this self–mailer to us. (NOTE: One copy of each publication has already been distributed to Motorola Service Shops (MSS's) and field technical representatives (FTR's).

First Fold

Check item desired:

☐ **Basic Logic Circuit Guide** — 68P81105E88

Describes the basic logic circuits used in Motorola Communications digital equip–ment and the logic notational scheme used in our instruction manuals.

68P81028E93–C

☐ **"Digital Private–Line" Binary–Coded Squelch** — 68P81106E83

Contains fundamentals of "Digital Private–Line" system operation, circuit operation and servicing techniques.

☐ **Safe Handling of CMOS Integrated Circuit Devices** — 68P81106E84

Describes special handling techniques needed to prevent irrepairable damage from static charges encountered with normal handling of CMOS devices.

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MOXY
TWO-WAY FM RADIO

150.8-174 MHz

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Bench Check . . . . . Page 2
Installation Planning - Mobile Radios . . . . . Page 2
Installation Planning - Base Stations . . . . . Page 3

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DIAGRAMS & PARTS LISTS
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Main Circuit Board Detail . . . . . 68P81034E51 (Sheet 1)
Receiver Schematic Diagram . . . . . 68P81034E51 (Sheet 2)
Radio Set Parts List . . . . . 68P81034E51 (Sheet 3)
Exciter and Power Amplifier Schematic Diagram . . . . . 68P81034E51 (Sheet 4)
TRN6904A "Private-Line" Encoder/Decoder Schematic Diagram and Circuit Board Detail 68P81034E52
TRN6906A "Digital Private-Line" Encoder-Decoder Schematic Diagram & Circuit Board Detail . . 68P81034E53
Parts List & CMOS Handling Precautions 68P81034E53
TMN1008A, TMN1009A, TMN1010A, TMN1011A, & TMN1018A Desk Microphone
Schematic Diagram, Circuit Board Detail, and Parts List 68P81030E06

MOTOROLA INC.
Communications Division

service publications
1301 E. Algonquin Road. Schaumburg, IL 60196

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68P81034E55-O
3/30/77-NPC

SAFETY INFORMATION

The United States Department of Labor, through the provisions of the Occupational Safety and Health Act of 1970 (OSHA), has established an electromagnetic radiation safety standard which applies to any two-way mobile radio equipment. Normal use of this radio will result in exposures far below the OSHA limit. There are no reported incidents of physical damage resulting from the use of this type radio. However, the following precautions are recommended:

DO NOT operate the transmitter when someone outside the vehicle is within two feet of the mobile antenna.

DO NOT operate the transmitter near unshielded electrical blasting caps or in an explosive atmosphere.

FPS-18196-B

RADIO SET ACCESSORY TABLE

KIT NUMBER	DESCRIPTION
TMN6113A	HANDSET
TRN6319A	HANDSET HANG-UP BOX
TRN6912A	REVERSE ESCUTCHEON, 1-FREQ. RADIOS
TRN6913A	REVERSE ESCUTCHEON, 2-FREQ. RADIOS
TSN6025A	EXTERNAL SPEAKER
TRN6223A	BASE STATION MOUNTING TRAY WITHOUT MICROPHONE CLIP
TRN6318A	BASE STATION MOUNTING TRAY WITH MICROPHONE CLIP
TRN6524A	SECURITY MOUNTING HARDWARE
TRN6525A	RADIO-TO-TRUNNION QUICK MOUNTING SCREWS
TLN5992A	LOCKING TRUNNION

SPECIFICATIONS

GENERAL

MAXIMUM BATTERY DRAIN @ 13.8 V	*MODEL*	*TRANSMIT*	*RECEIVE*	*STANDBY (SQUELCHED)*
	10-WATT	3 A	1.0 A	0.3 A
	20-WATT	5.5 A		
FREQUENCY RANGE		150.8-174 MHz		
DIMENSIONS		2-1/4" H x 6-1/2" W x 8-1/2" D		
WEIGHT		1.4 kg (3.0 lbs.)		

TRANSMITTER

RF POWER OUTPUT	*10 WATTS*	*20 WATTS*
SPURIOUS & HARMONIC EMISSIONS	56 dB below carrier	60 dB below carrier
OUTPUT IMPEDANCE	50 ohms	
FREQUENCY STABILITY	±0.0005%; -30°C to +60°C (+25°C reference)	
MODULATION	16F3	
AUDIO SENSITIVITY	160 mV ±3 dB for 3.0 kHz deviation at 1000 Hz	
FM HUM & NOISE	-70 dB below ±3.0 kHz deviation at 1000 Hz	
AUDIO RESPONSE	+1, -3 dB of 6 dB/octave pre-emphasis from 300 to 3000 Hz	
AUDIO DISTORTION	Less than 3%	

RECEIVER

CHANNEL SPACING	30 kHz
SELECTIVITY -EIA SINAD	-65 dB @ ±30 kHz
EIA SINAD INTERMODULATION	-70 dB
EIA MODULATION ACCEPTANCE	±7 kHz
SENSITIVITY	0.35 uV or less for 20 dB quieting. 0.3 uV or less for 12 dB sinad.
FREQUENCY STABILITY	±0.0005%; -30°C to +60°C (+25°C reference)
SPURIOUS & IMAGE REJECTION	Greater than 70 dB
SQUELCH THRESHOLD SENSITIVITY	Less than 0.2 uV
AUDIO OUTPUT	3 watts, with less than 10% distortion
AUDIO RESPONSE	+2, -8 dB/octave de-emphasis from 300 to 3000 Hz

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

FCC TRANSMITTER LICENSE DESIGNATIONS

RF OUTPUT	SINGLE FREQUENCY	TWO FREQUENCY
10 Watts	CC3295	CC3296
20 Watts	CC3297	CC3298

FCC RECEIVER CERTIFICATION NUMBERS

SINGLE FREQUENCY: RC0160
TWO-FREQUENCY: RC0161

MOTOROLA

MODEL CHART

FOR

"MOXY"

FM TWO-WAY RADIO

150.8-174 MHz

10 W & 20 W RF POWER

+12 V MOBILE

117 V AC BASE STATION

CODE:

[X] = ONE ITEM SUPPLIED WITH EACH RADIO

[/] = ONE ITEM SUPPLIED WITH EACH RADIO, DEPENDENT UPON FREQUENCY

[2] = NUMBER INDICATES QUANTITY SUPPLIED WITH EACH RADIO

[*] = REFER TO UNIFIED CHASSIS MODEL BREAKDOWN CHART FOR LOWER LEVEL KITS

ITEM	DESCRIPTION	MODEL NUMBER	MOBILE MODELS: NUMBER OF OPERATING FREQUENCIES	MOBILE MODELS: SQUELCH TYPE	MOBILE MODELS: RF POWER	BASE STATION MODELS: NUMBER OF OPERATING FREQUENCIES	BASE STATION MODELS: SQUELCH TYPE	BASE STATION MODELS: RF POWER
		D23GMA1000AK	1	CARRIER	10 W			
		D23GMA1300AK	2	CARRIER	10 W			
		D23GMA3000AK	1	"PRIVATE-LINE"	10 W			
		D23GMA3300AK	2	"PRIVATE-LINE"	10 W			
		D23GMA6000AK	1	"DIGITAL PRIVATE-LINE"	10 W			
		D23GMA6300AK	2	"DIGITAL PRIVATE-LINE"	10 W			
		D33GMA1000AK	1	CARRIER	20 W			
		D33GMA1300AK	2	CARRIER	20 W			
		D33GMA3000AK	1	"PRIVATE-LINE"	20 W			
		D33GMA3300AK	2	"PRIVATE-LINE"	20 W			
		D33GMA6000AK	1	"DIGITAL PRIVATE-LINE"	20 W			
		D33GMA6300AK	2	"DIGITAL PRIVATE-LINE"	20 W			
		L33GMB1100AM				1	CARRIER	10 W
		L33GMB1300AM				2	CARRIER	10 W
		L33GMB3100AM				1	"PRIVATE-LINE"	10 W
		L33GMB3130AM				2	"PRIVATE-LINE"	10 W
		L33GMB6100AM				1	"DIGITAL PRIVATE-LINE"	10 W
		L33GMB6130AM				2	"DIGITAL PRIVATE-LINE"	10 W
		L43GMB1100AM				1	CARRIER	20 W
		L43GMB1130AM				2	CARRIER	20 W
		L43GMB3100AM				1	"PRIVATE-LINE"	20 W
		L43GMB3130AM				2	"PRIVATE-LINE"	20 W
		L43GMB6100AM				1	"DIGITAL PRIVATE-LINE"	20 W
		L43GMB6130AM				2	"DIGITAL PRIVATE-LINE"	20 W
*TUD2032AB	UNIFIED CHASSIS (150.8-162 MHz; 1-FREQ., 10 W)							
*TUD2032AH	UNIFIED CHASSIS (150.8-162 MHz; 2-FREQ., 10 W)							
*TUD2033AB	UNIFIED CHASSIS (162-174 MHz; 1-FREQ., 10 W)							
*TUD2033AH	UNIFIED CHASSIS (162-174 MHz; 2-FREQ., 10 W)							
*TUD2042AB	UNIFIED CHASSIS (150.8-162 MHz; 1-FREQ., 20 W)							
*TUD2042AH	UNIFIED CHASSIS (150.8-162 MHz; 2-FREQ., 20 W)							
*TUD2043AB	UNIFIED CHASSIS (162-174 MHz; 1-FREQ., 20 W)							
*TUD2043AH	UNIFIED CHASSIS (162-174 MHz; 2-FREQ., 20 W)							
TRN6904A	ENCODER/DECODER, "PRIVATE-LINE"							
TRN6906A	ENCODER/DECODER, "DIGITAL PRIVATE-LINE"							
TPN1136A	POWER SUPPLY, 110 V							
THN6321A	HOUSING							
TAD6112A	ANTENNA, ROOF TOP (144-152 MHz)							
TAD6113A	ANTENNA, ROOF TOP (152-162 MHz)							
TAD6114A	ANTENNA, ROOF TOP (162-174 MHz)							
TMN1008A	MICROPHONE, DESK; "PRIVATE-LINE"							
TMN1009A	MICROPHONE, DESK; CARRIER SQUELCH							
TMN6130A	MICROPHONE, MOBILE							
TKN6794A	POWER CABLE, 25 W							
TRN6223A	BASE TRAY							
KLN6209A	"VIBRASPONDER" RESONANT REED							
KXN6121AA	CRYSTAL, TRANSMITTER (150.8-174 MHz)							
KXN6122AA	CRYSTAL, RECEIVER (150.8-174 MHz)							
TRN6899A	HARDWARE, 1-FREQ., "PRIVATE-LINE"							
TRN6900A	HARDWARE, 2-FREQ., "PRIVATE-LINE"							
TRN6901A	HARDWARE, 2-FREQ., CARRIER SQUELCH							
TRN6005A	CODE PLUG							
TRN6902A	ESCUTCHEON, 1-FREQ.							
TRN6903A	ESCUTCHEON, 2-FREQ.							
TRN6905A	INSTALLATION KIT, MOBILE							

EPS-23186-O

MOTOROLA

UNIFIED CHASSIS

MODEL BREAKDOWN CHART

FOR

"MOXY"

FM TWO-WAY RADIO

CODE:

[X] = ONE ITEM SUPPLIED

MODEL NUMBER	DESCRIPTION	ITEM: TUD2032AB	TUD2032AH	TUD2033AB	TUD2033AH	TUD2042AB	TUD2042AH	TUD2043AB	TUD2043AH
	DESCRIPTION: UNIFIED CHASSIS (150.8-162 MHz; 1-FREQ., 10 W)	X							
	UNIFIED CHASSIS (150.8-162 MHz; 2-FREQ., 10 W)		X						
	UNIFIED CHASSIS (162-174 MHz; 1-FREQ., 10 W)			X					
	UNIFIED CHASSIS (162-174 MHz; 2-FREQ., 10 W)				X				
	UNIFIED CHASSIS (150.8-162 MHz; 1-FREQ., 20 W)					X			
	UNIFIED CHASSIS (150.8-162 MHz; 2-FREQ., 20 W)						X		
	UNIFIED CHASSIS (162-174 MHz; 1-FREQ., 20 W)							X	
	UNIFIED CHASSIS (162-174 MHz; 2-FREQ., 20 W)								X
TLD5692A	MAIN CIRCUIT BOARD (150.8-162 MHz; 1-FREQ., 10 W)	X							
TLD5693A	MAIN CIRCUIT BOARD (162-174 MHz; 1-FREQ., 10 W)		X						
TLD5702A	MAIN CIRCUIT BOARD (150.8-162 MHz; 2-FREQ., 10 W)			X					
TLD5703A	MAIN CIRCUIT BOARD (162-174 MHz; 2-FREQ., 10 W)				X				
TLD5712A	MAIN CIRCUIT BOARD (150.8-162 MHz; 1-FREQ., 20 W)					X			
TLD5713A	MAIN CIRCUIT BOARD (162-174 MHz; 1-FREQ., 20 W)						X		
TLD5722A	MAIN CIRCUIT BOARD (150.8-162 MHz; 2-FREQ., 20 W)							X	
TLD5723A	MAIN CIRCUIT BOARD (162-174 MHz; 2-FREQ., 20 W)								X
TRN6897A	HARDWARE KIT (10 W)	X	X	X	X				
TRN6898A	HARDWARE KIT (20 W)					X	X	X	X

EPS-23187-O

FOREWORD

1. SCOPE OF MANUAL

This manual is intended for use by experienced technicians familiar with similar types of equipment. It contains all service information required for the equipment described and is current as of the printing date. Changes which occur after the printing date are incorporated by Instruction Manual Revisions (SMR). These SMR's are added to the manuals as the engineering changes are incorporated into the equipment.

2. MODEL AND KIT IDENTIFICATION

Motorola equipments are specifically identified by an overall model number on the nameplate. In most cases, assemblies and kits which make up the equipment also have kit model numbers stamped on them. When a production or engineering change is incorporated, revision suffix numerals are added to the affected kit model number. For example, a TLN4448A becomes a TLN4448A-1 with the first revision, TLN4448A-2 with the second revision, etc.

As diagrams are updated, information about the change is incorporated into a revision column. This revision column appears in the manual next to the parts list or, in some cases, on the diagram. It lists the reference number, part number, and description of the parts removed or replaced when the suffix number changed. With this information, the technician can find the information for the current version, and any previous version, of the equipment covered by the manual.

3. SERVICE

Motorola's National Service Organization offers one of the finest nation-wide installation and maintenance programs available to communication equipment users. This organization includes approximately 800 authorized Motorola Service Stations (MSS) located throughout the United States, each manned by one or more trained, FCC licensed technicians.

These MSS's are independently owned and operated and were selected by Motorola to service its customers. Motorola maintenance is available on either a time and material basis or on a periodic fixed-fee type arrangement.

The administrative staff of this organization consists of national, area and district service managers and district representatives, all of whom are Motorola employees with the objective to improve the service to our customers.

Should you wish to purchase a service contract for your Motorola equipment, contact your Motorola Service Representative, or write to:

National Service Manager
Motorola Communications Division
1303 E. Algonquin Road
Schaumburg, Illinois 60196

4. REPLACEMENT PARTS ORDERING

Motorola maintains a number of parts offices strategically-located throughout the United States. These facilities are staffed to process parts orders, identify part numbers, and otherwise assist in the maintenance and repair of Motorola Communications Division products.

Orders for all parts *except* crystals, channel elements, and "Vibrasender" ® and "Vibrasponder" ® resonant reeds should be sent to the nearest area parts center. Orders for instruction manuals should also be sent to the area parts center.

When ordering replacement parts or equipment information, the complete identification number should be included. This applies to all components, kits, and chassis. If the component part number is not known, the order should include the number of the chassis or kit of which it is a part, and sufficient description of the desired component to identify it.

Orders for crystals, channel elements, active filters, code plugs, and reeds should be sent directly to the factory address listed on the following page. Crystal and channel element orders should specify the crystal or channel element type number, crystal and carrier frequency, and the chassis model number in which the part is used.

Orders for active filters, code plugs, "Vibrasender" and "Vibrasponder" resonant reeds should specify type number and frequency, and should identify the owner/operator of the communications system in which these items are to be used.

5. ADDRESSES

5.1 GENERAL OFFICES

MOTOROLA, INC.
Communications Group Parts Dept.
1313 E. Algonquin Rd.,
Schaumburg, Illinois 60196
Phone: 312-576-6521
Executive Offices: 1303 E. Algonquin Rd.,
Schaumburg, Illinois 60196

5.2 U.S. ORDERS

WESTERN AREA PARTS
1170 Chess Drive, Foster City,
San Mateo, California 94404
Phone: 415-349-3111
TWX: 910-375-3877

MIDWEST AREA PARTS
10 W. North Ave.,
Lombard, Ill. 60148
Phone: 312-620-3000
TWX: 910-693-1592

MID-ATLANTIC AREA PARTS
6701 Elkridge Landing Road,
Linthicum, Maryland 21090
Phone: 301-796-8600

EAST CENTRAL AREA PARTS
12995 Snow Road,
Parma, Ohio 44130
Phone: 216-267-2210
TWX: 810-421-8845

EASTERN AREA PARTS
85 Harristown Road,
Glen Rock, New Jersey 07452
Phone: 201-447-4000
TWX: 710-988-5602

PACIFIC SOUTHWESTERN AREA PARTS
2333 Utah Avenue,
El Segundo, California 90245
Phone: 213-644-1101
TWX: 910-348-6278

SOUTHWESTERN AREA PARTS
3320 Belt Line Road,
Dallas, Texas 75234
Phone: 214-241-2151
TWX: 910-860-5505

SOUTHEASTERN AREA PARTS
5096 Panola
Industrial Blvd.
Decatur, Georgia 30032
Phone: 504-981-9800
TWX: 810-751-8300

5.3 CANADIAN ORDERS

CANADIAN MOTOROLA ELECTRONICS COMPANY
Parts Department
3125 Steeles Avenue,
East Willowdale, Ontario
Phone: 516-499-1441
TWX: 610-492-2713
Telex: 02-29944LD

5.4 ALL COUNTRIES EXCEPT U.S. AND CANADA

MOTOROLA, INC. OR MOTOROLA AMERICAS, INC.
International Parts Dept.
1313 E. Algonquin Road
Schaumburg, Illinois 60196 U.S.A.
Phone: 312-576-6492
TWX: 910-693-1592 or 1599
Telex: 722443 or 722424
Cable: MOTOL

5.5 FACTORY ADDRESS FOR CRYSTAL, CHANNEL ELEMENT, ACTIVE FILTER, CODE PLUGS AND RESONANT REED ORDERS

AIR MAIL ORDERS
Motorola, Inc.
Component Products Sales & Service
P.O. Box 66191
O'Hare International Airport
Chicago, Ill. 60666

REGULAR MAIL ORDERS AND CORRESPONDENCE
Motorola, Inc.
Component Products Sales & Service
2553 N. Edgington Street
Franklin Park, Illinois 60131

OPERATOR'S INSTRUCTIONS

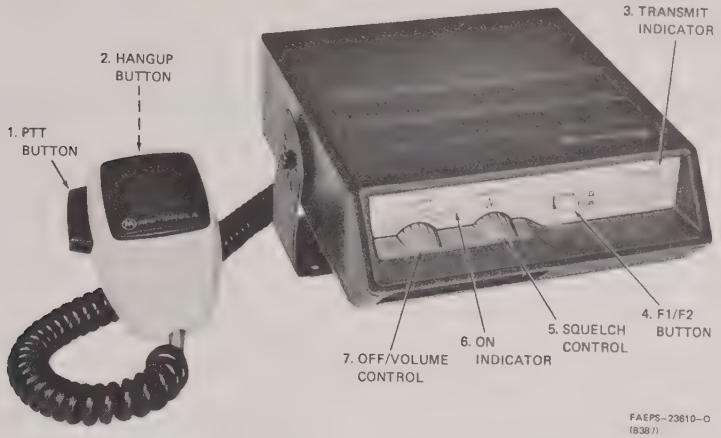


Figure 1. Operating Controls and Indicators

1. TO TURN ON RADIO

Refer to Figure 1. The on-off switch for the radio set is operated by the OFF-VOLUME control (7). To turn on the radio set, rotate the OFF-VOLUME control knob clockwise until a click is heard. The front panel lamp then turns on to illuminate the control labels and the green ON indicator (6).

2. TO RECEIVE

	OPERATION	PROCEDURE
1.	Disable PL (PL models only)	Remove microphone from hang-up clip.
2.	Unsquelch radio	Turn SQUELCH control (5) counterclockwise until noise is heard.
3.	Set VOLUME control	Adjust VOLUME control for a comfortable listening level.
4.	Set SQUELCH control	Turn SQUELCH control clockwise until noise just stops.
5.	Select operating frequency. (Two-frequency models only)	Press F1/F2 button (4), as needed.
	The radio is now adjusted to receive *all* messages on the selected frequency.	
6.	Enable PL (PL models only)	Return microphone to hang-up clip.
	You are now able to hear messages for your system only.	

3. TO TRANSMIT

3.1 MOBILE STATION

IMPORTANT NOTE

When operating in extremely cold ambient conditions (-10 to -30°C), allow 2 minutes after radio is turned on before transmitting. This will ensure compliance with FCC rules and regulations.

	OPERATION	PROCEDURE
1.	Disable PL (PL models only)	Remove microphone from hang-up box.
2.	Select operating frequency (Two-frequency models only)	Press F1/F2 button, as needed.
3.	Listen	DO NOT TRANSMIT if anyone is using the channel.
4.	Key transmitter	Press and hold down microphone PTT button (1). Red TRANSMIT light on radio front panel (3) will glow indicating that the transmitter is "on-the-air".
5.	Transmit message	Hold microphone about 2 inches from your lips and speak slowly into microphone at a normal voice level. Shouting will not make your message easier to understand. Make each transmission as brief as possible.
6.	Receive reply	Release microphone PTT button.
7.	Enable PL at end of conversation (PL models only)	Return microphone to hang-up clip.

3.2 BASE STATION

	OPERATION	PROCEDURE
1.	Select operating frequency (two-frequency models only)	Press F1/F2 button, as needed.
2.	Monitor the radio channel	Depress the microphone MONITOR switch.
3.	Listen	Briefly listen for conversations on the radio channel.
4.	Transmit the message	If the radio channel is not in use, depress and hold both the microphone MONITOR and TRANSMIT switches while speaking about 6 inches from the microphone. Speak distinctly and at a normal level. Release the TRANSMIT switch at the end of the message or to receive a reply.
5.	Enable receiver muting (carrier squelch models)	At the end of the message or conversation release the microphone MONITOR switch.

NOTE

If JU2 is removed from the microphone (normal for paging base station to ensure that the operator monitors the channel) both the microphone transmit and monitor buttons must be pressed to transmit -- releasing either switch ends the transmission.

PREINSTALLATION INSTRUCTIONS

1. UNPACKING

When unpacking the radio from its shipping carton, refer to the model chart at the front of this manual. If any item is missing, contact your Motorola representative immediately.

2. LICENSING REQUIREMENTS

FCC Regulations state that a station license must be obtained for each radio installation (mobile or base) by the owner of the equipment. The station licensee is responsible for ensuring that the transmitter power, frequency, and deviation are within the limits permitted under the station license. Adjustments to the transmitter section of the radio may be made only by a technician possessing an FCC commercial operator's license. No license is required to install, check out, or operate the radio.

3. BENCH CHECK

3.1 INTRODUCTION

Each radio set is adjusted, tested, and inspected before shipment. However, it is recommended that both the transmitter and receiver sections of the radio be checked for proper operation just prior to installation.

3.2 TESTING

The radio should be tested with all cables and accessories supplied with the radio connected as they will be in the final installation. The frequency, deviation, and output power of the transmitter should be checked, as well as the sensitivity, squelch operation, and audio quality of the receiver. Radios with PL or DPL capabilities should be operated in that mode to verify proper encode/decode performance. Refer to the Specifications page at the front of this manual to determine whether the radio is operating properly. Improper operation can generally be corrected by touching up the receiver or transmitter alignment.

4. INSTALLATION PLANNING - MOBILE RADIOS

4.1 GENERAL

Planning is the key to fast, easy radio installation. Before a hole is drilled or a wire is run, inspect the vehicle and determine how and where you intend to mount the antenna, radio set, and accessories. Plan wire and cable runs to provide maximum protection from pinching, crushing, and overheating.

4.2 ANTENNA MOUNTING

The best mounting location for the antenna is in the center of a large, flat conductive surface. In almost all vehicles these requirements are best satisfied by mounting the antenna at the center of the roof. Some vehicles have a large trunk lid that will provide a good antenna location. If the trunk lid is used, connected grounding straps between the trunk lid and vehicle chassis to insure that the trunk lid is at chassis ground.

4.3 RADIO MOUNTING

4.3.1 General

The trunnion mount allows the radio set to be mounted to a variety of mounting surfaces. Be sure the mounting surface is able to adequately support the weight of the radio. Allow sufficient space around the radio for free air flow for cooling. Be sure the unit is close enough to the vehicle operator to permit easy access to the operating controls while he is driving.

4.3.2 Inverted Escutcheon Installation

A front panel escutcheon with inverted lettering (Motorola Option B96) is available if you plan to mount the radio above the operator's normal line of sight. Install the inverted escutcheon as follows:

Step 1. Remove the radio chassis from its housing.

Step 2. Using a long screwdriver, push on the back of the upright escutcheon until it is free of the radio housing front panel.

Step 3. Remove the tape from the back of the inverted escutcheon. Press the inverted escutcheon onto the radio housing front panel.

Step 4. Pull the pushbutton off the F1/F2 switch. Invert the pushbutton and replace it on the switch.

Step 5. Reinstall the radio chassis into the housing. Be sure the chassis locking tabs properly engage the slots in the housing.

4.4 DC POWER AND WIRING

4.4.1 This radio must be operated *only* in negative-ground electrical systems. Reverse polarity will

not damage the radio, but the cable fuse will blow. Check the vehicle ground polarity before you begin installation to prevent wasted time and effort.

4.4.2 Connect the red power lead through F601 to the vehicle battery positive terminal. Connecting the red lead to any other positive voltage point in the vehicle is *not recommended.*

CAUTION

If dc power is to be controlled by the vehicle ignition switch, a switching relay (Motorola Part No. 59-813674) should be used to switch the red power lead. The vehicle ignition switch, then, controls dc to the relay coil.

4.4.3 Connect the black power lead to a good ground point on the vehicle chassis. *Do not* connect the black lead directly to the battery negative terminal.

4.4.4 The wiring provided with the radio is of sufficient size to handle the maximum radio current demand. If wiring must be added to that provided, be sure the gauge of the added wire is sufficient for the current to be carried and length of the added run.

5. INSTALLATION PLANNING - BASE STATIONS

5.1 ANTENNA SYSTEM

Selecting the antenna system for your base radio depends on factors beyond the scope of this manual. Your Motorola representative can help you choose the antenna system that will best serve your particular needs.

5.2 RADIO LOCATION

Choose a location for your base radio as close as possible to where the antenna cable enters the building. Be sure 117 volt, 60 Hz power is available. Make sure sufficient air can flow around the radio to permit adequate cooling.

INSTALLATION INSTRUCTIONS

1. MOBILE RADIOS

Step 1. Mount the antenna, using the instructions provided with the antenna kit. Run the coaxial cable to the intended radio set mounting location. Cut off the excess cable and install the cable connector.

Step 2. Route power wiring, but do not make power connections and do not tie the wires down. Be sure to use grommets wherever the wiring must pass through a metal panel.

Step 3. Mount the radio set trunnion mounting bracket. See Figure 2.

Step 4. Mount the microphone hang-up clip. If mounting surface is not at chassis ground, use the black wire supplied with the radio to connect the hang-up clip to a convenient ground point.

Step 5. Connect the power plug and coaxial cable connector to the radio set. See Figure 3. Install the radio in the trunnion mounting bracket.

Step 6. Complete the power wire installation. Be sure to leave sufficient slack wire behind the radio set to make the unit easy to remove and reinstall. Strap the wire down where necessary being sure the wires do not make contact with hot areas on the engine. Be sure the wires cannot be snagged by the operator's feet or during normal vehicle operation. Cut off the excess power lead length and attach the terminal lugs supplied.

Step 7. If an external speaker is used, secure wiring to the speaker as needed. Allow sufficient slack in wiring for future maintenance.

Step 8. Connect the power leads. Be sure the connection points are clean and free of paint, dirt, and corrosion.

Step 9. Test radio and its accessories for proper system operation. Check the antenna SWR, using an in-line wattmeter.

CAUTION

After installation, remove the protective film from the escutcheon. To remove any dust accumulation from the escutcheon, always wipe with a damp cloth.

2. BASE STATIONS

Step 1. Mount the radio set to the base mounting tray.

Step 2. Prepare radio set power leads as follows: Attach the provided pins to the ends of the red and black power leads. Insert power leads into the mating plug of the base station power supply output jack; red lead pin into position 4 and the black lead pin into position 1. (See Fixed Station Power Supply section of this manual.)

Step 3. Connect an in-line wattmeter between the radio antenna connector and the antenna system.

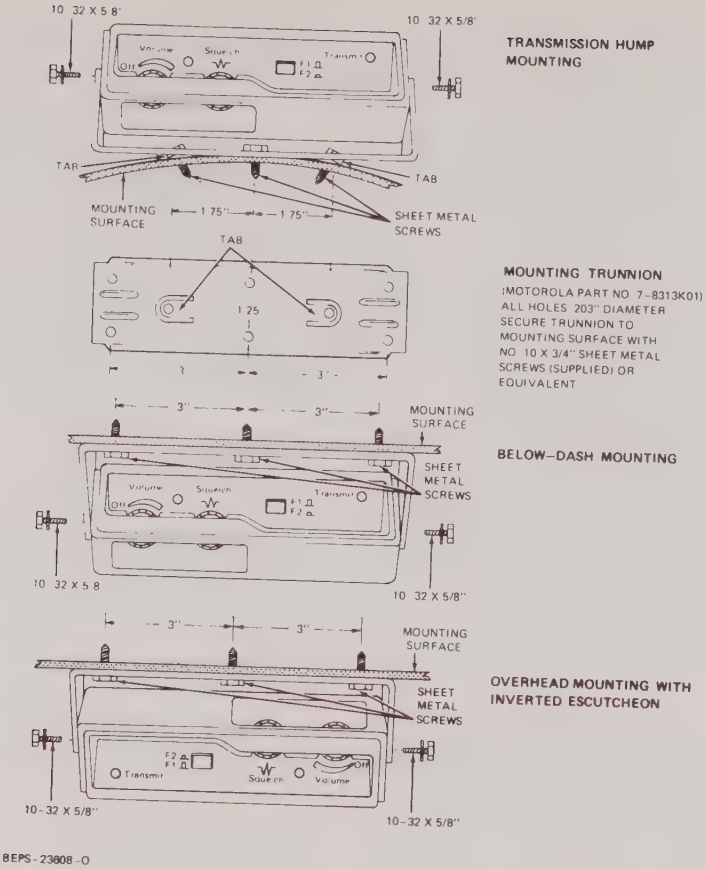


Figure 2. Radio Mounting Detail

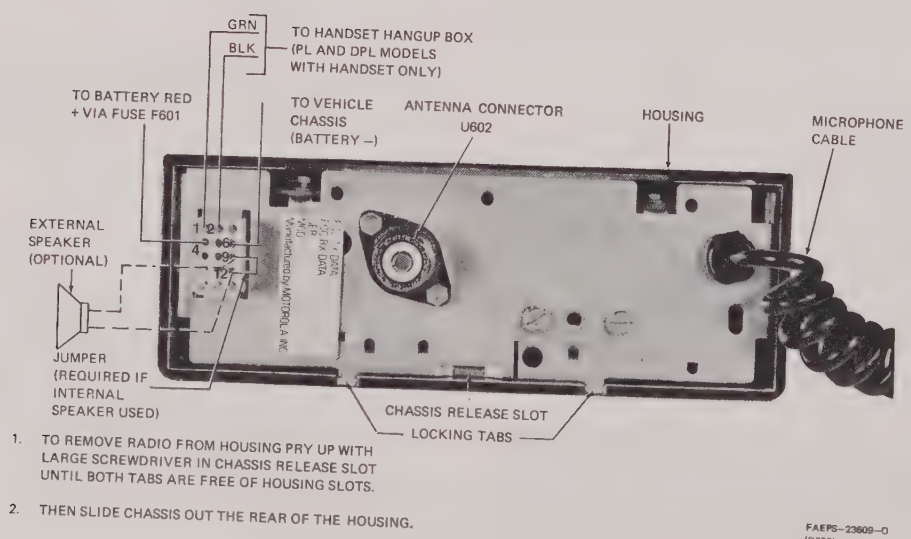


Figure 3. Connections to Radio Set Rear Panel

Step 4. Plug the base dc power supply into the 117 volt, 60 Hz outlet. Set the AC POWER switch on the power supply to the ON position.

Step 5. Key the transmitter and check the antenna system VSWR. If the VSWR is 3:1 or lower, disconnect the wattmeter and connect the antenna coaxial cable to the radio set antenna jack.

Step 6. Test the radio set and accessories for proper operation. A brief conversation with a mobile unit in your system will indicate whether the base station is operating satisfactorily.

CAUTION

After installation, remove the protective film from the escutcheon. To remove any dust accumulation from the escutcheon, always wipe with a damp cloth.

SERVICE

1. INTRODUCTION

This radio is designed for easy servicing. Numerous test points are provided on the radio circuit board. For servicing information, refer to the schematic diagrams, circuit board details, and alignment procedures in this manual. Theory of operation is shown on the schematic diagrams.

2. HOUSING REMOVAL

(Refer to Figure 3)

Step 1. Remove the screws that hold the radio set in the trunnion mount.

Step 2. Insert a screwdriver blade into the screwdriver slot near the bottom of the radio chassis rear panel.

Step 3. Push the screwdriver against the housing until the chassis locking tabs clear the slots in the radio housing.

Step 4. Slide the radio chassis out the back of the housing.

3. POWER PLUG WIRE REPLACEMENT

A special wire extraction tool (Motorola model number ST1145) is available to remove wires from power plug P601. The tool must be used for ease of wire extraction and to prevent damage to the connector or its pins.

HANDLING PRECAUTIONS FOR CMOS INTEGRATED CIRCUITS

Many of the integrated circuit devices used in communications equipment are of the CMOS (Complementary Metal Oxide Semiconductor) type. Because of their high open circuit impedance, CMOS ICs are vulnerable to damage from static charges. Care must be taken in handling, shipping, and servicing them and the assemblies in which they are used.

Even though protection devices are provided in CMOS IC inputs, the protection is effective only against overvoltage in the hundreds of volts range such as are encountered in an operating system. In a system, circuit elements distribute static charges and load the CMOS circuits, decreasing the chance of damage. However, CMOS circuits can be damaged by improper handling of the modules even in a system.

To avoid damage to circuits, observe the following handling, shipping, and servicing precautions:

(1) Prior to and while servicing a circuit module, particularly after moving within the service area, momentarily touch both hands to a bare metal earth grounded surface. This will discharge any static charge which may have accumulated on the person doing the servicing.

(2) Whenever possible avoid touching any electrically conductive parts of the circuit module with your hands.

(3) Normally, circuit modules can be inserted or removed with power applied to the unit. However, check the INSTALLATION and MAINTENANCE sections of the manual as well as the module schematic diagram to insure there are no objections to this practice.

(4) When servicing a circuit module, avoid carpeted areas, dry environments, and certain types of clothing (silk, nylon, etc.) because they contribute to static buildup.

(5) All electrically powered test equipment should be grounded. Apply the ground lead from the test equipment to the circuit module before connecting the test probe. Similarly, disconnect the test probe prior to removing the ground lead.

(6) If a circuit module is removed from the system, it is desirable to lay it on a conductive surface (such as a sheet of aluminum foil) which is connected to ground through a resistance of approximately 100k.

WARNING

If the aluminum foil is connected directly to ground, be cautious of possible electrical shock from contacting the foil at the same time as other electrical circuits.

(7) When soldering, be sure the soldering iron is grounded.

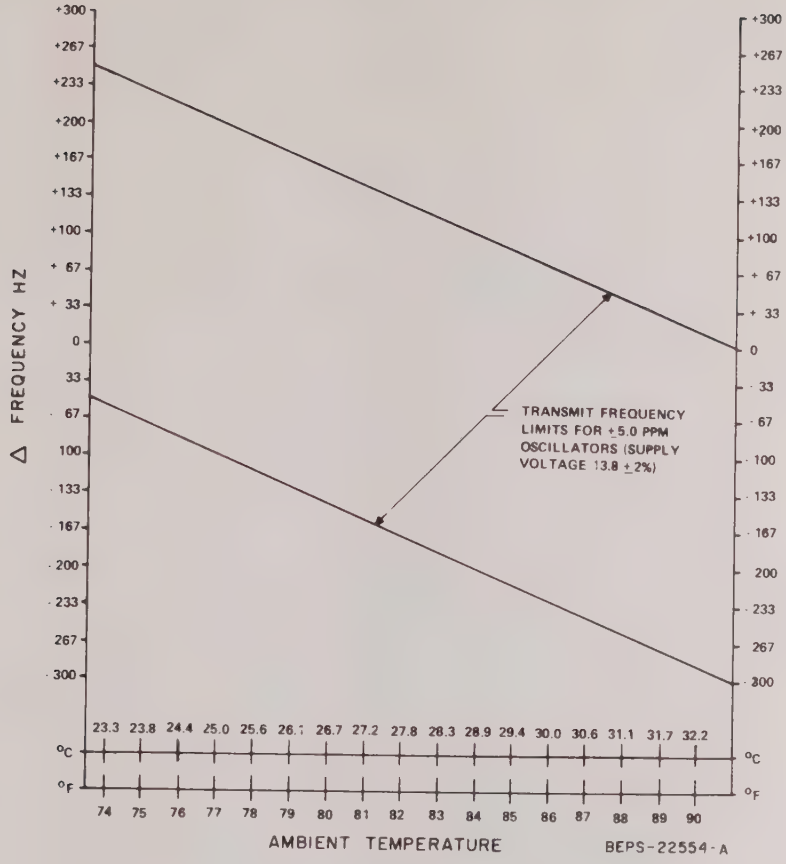
(8) Prior to connecting jumpers, replacing circuit components, or touching CMOS pins (if this becomes necessary in the replacement of an integrated circuit device), be sure to discharge any static buildup as described in procedure 1. Since voltage differences can exist across the human body, it is recommended that only one hand be used if it is necessary to touch pins on the CMOS device and associated board wiring.

(9) When replacing a CMOS integrated circuit device, leave the device in its metal rail container or conductive foam until it is to be inserted into the printed circuit module.

(10) All low impedance test equipment (such as pulse generators, etc.) should be connected to CMOS device inputs after power is applied to the CMOS circuitry. Similarly, such low impedance equipment should be disconnected before power is turned off.

(11) Replacement modules shipped separately from the factory will be packaged in a conductive material. Any modules being transported from one area to another should be wrapped in a similar material (aluminum foil may be used). NEVER USE NONCONDUCTIVE MATERIAL for packaging these modules.

ACCEPTABLE LIMITS FOR FIELD FREQUENCY MEASUREMENTS



IDC ADJUSTMENT

Oscillator frequency adjustment must be made BEFORE setting the IDC controls.

SET-UP:

1. Set the deviation meter operating controls as needed.

2. *In PL radios*, remove the "Vibrasponder" resonant reed from its socket on the PL board.
   In DPL radios, disable the DPL encoder by shorting together the "code disable" plating pads on the DPL board.

3. Disconnect the microphone white wire from pin (U) and connect the output of an audio signal generator as follows:

   - High side through a 1 uF capacitor (+ end toward the radio) to pin (U)
   - Low side to radio chassis.

NOTE

The transmitter can be keyed by pressing the microphone PTT button or by shorting pin (X) to the radio chassis.

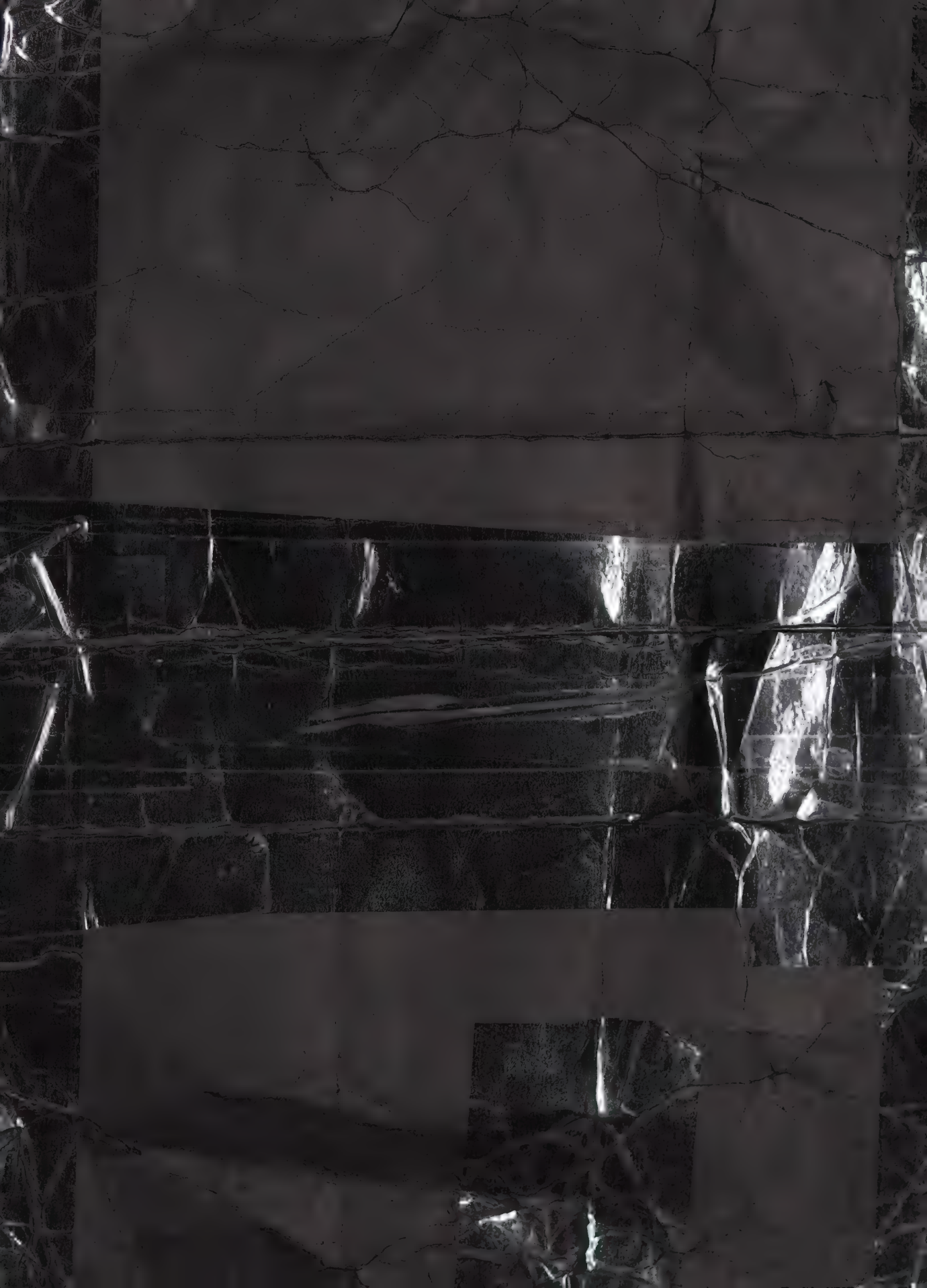
4. Connect an ac voltmeter across the audio signal generator output.

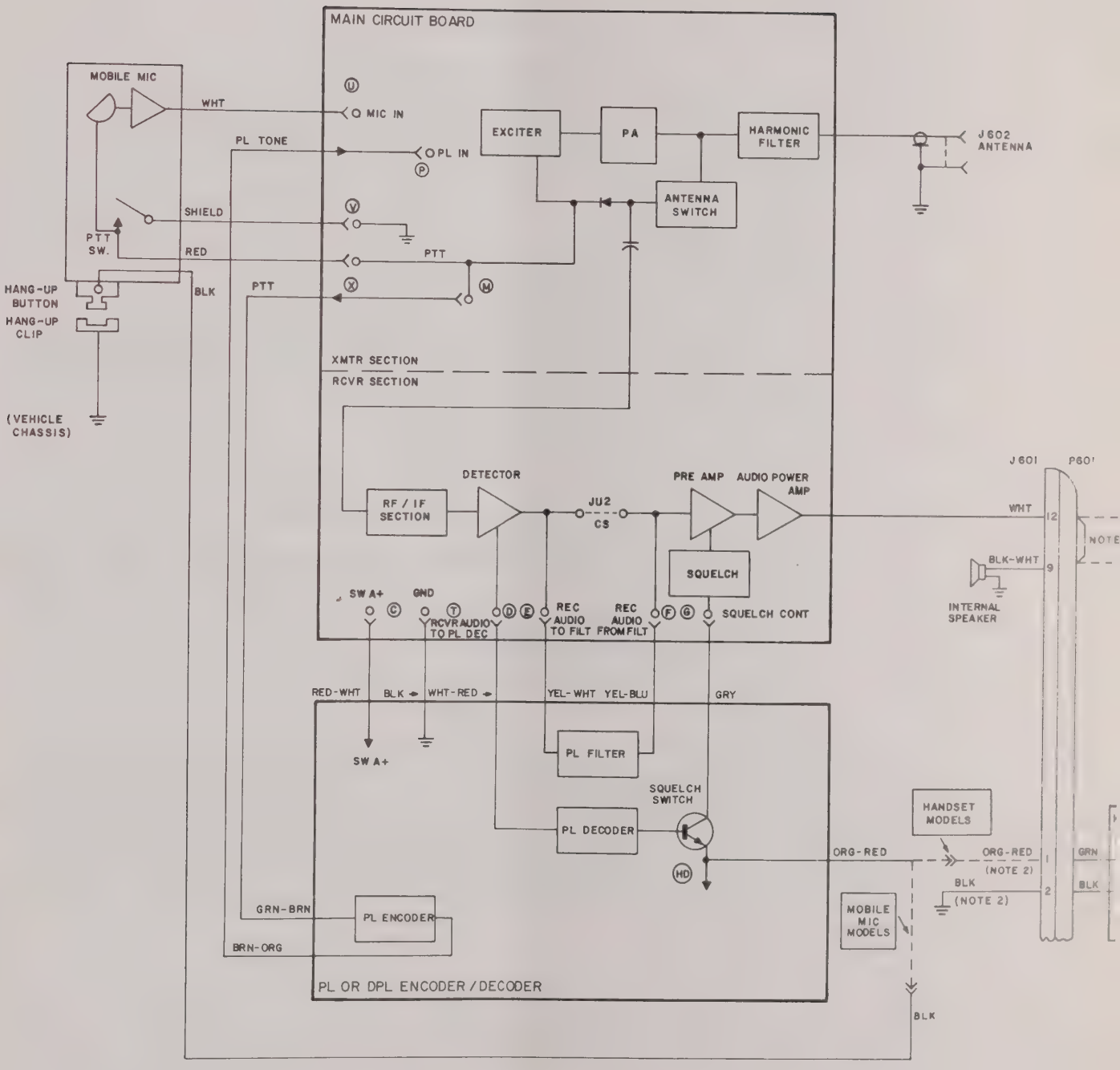
IDC ADJUSTMENT PROCEDURE

STEP	PROCEDURE
1	Set audio signal generator output frequency to 1000 Hz and output level to 0.8 V.
2	Select F1 and key transmitter. Adjust F1 "IDC" control R115 for ±5 kHz deviation meter reading.
3	On 2-freq. models, select F2 and key transmitter. Adjust F2 "IDC" control R131 for ±5 kHz deviation meter reading.
4	Reduce audio signal generator output level until deviation meter reads ±3.0 kHz. Audio oscillator output level should be 165 mV ±3 dB.
	"PRIVATE-LINE" MODELS ONLY
5A	Insert resonant reed into socket on PL board and disconnect audio oscillator from pin (U)
6A	Key transmitter and adjust Tone Level control R433 for PL tone deviation reading of 800 Hz.
7A	Reconnect audio signal generator to pin (U) and repeat steps 1 through 3. Be sure overall deviation does not exceed ±5 kHz, including PL tone.
8A	Reconnect white wire from microphone to pin (U) .
	or
	"DIGITAL PRIVATE-LINE" MODELS ONLY (SEE NOTE)
5B	Remove the short from between the "code disable" plating pads on the DPL board and disconnect the audio signal generator from pin (U) .
6B	Key the transmitter and adjust Code Level set control R342 for a DPL code deviation reading of 750 Hz.
7B	Reconnect the audio signal generator to pin (U) . Repeat steps 5 and 6. Be sure overall deviation does not exceed ±5 kHz, including DPL code.
8B	Reconnect white wire from microphone to pin (U) .

NOTE

To obtain accurate measurement of transmitter deviation in radios equipped with "Digital Private-Line" binary-coded squelch, the frequency response of the deviation measuring equipment must be <1 Hz. If a deviation meter with this low frequency response characteristic is not available, the transmitter deviation can be checked by making the transmitter send continuous sinewave during the measurement. Standard test equipment will then provide an accurate deviation measurement. To make the transmitter send continuous sinewave, short together the base and emitter plating of PTT inverter Q309, cut the jumper between C322 and ground, and key the transmitter. When the IDC alignment is completed, replace the jumper between C322 and ground.





Functional Interconnect Diagram
Motorola No. DEPS-23922-O
3/31/77-NPC

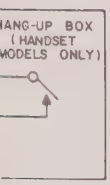
NOTES:

1. JU2 ADDED FOR CARRIER SQUELCH RADIOS.

2. A) J601–1 ORN–RED WIRE IS A JUMPER USED TO CONNECT THE ORN–RED WIRE FROM THE "PRIVATE–LINE" OR "DIGITAL PRIVATE–LINE" BOARD TO THE CONNECTOR J601. GROUND IS SUPPLIED THROUGH BLACK GROUND WIRE WHICH M MUST BE ADDED FROM J601–2 TO CHASSIS. (ALL WIRES ARE SUPPLIED WITH PL OR DPL HANDSETS.)

   B) IF HANG–UP BOX IS USED WITH CARRIER SQUELCH RADIO, GROUND WIRE (P/O TRN6209A GROUND WIRE KIT) MUST BE ADDED FROM J601–2 TO CHASSIS.

3. WHEN THE OPTIONAL EXTERNAL SPEAKER IS USED, THE JUMPER BETWEEN PINS 9 AND 12 OF ACCESSORY/POWER CONNECTOR P601 IS REMOVED.



DEPS-23922-0

REFERENCE SYMBOL	PART NO.	DESCRIPTION

PARTS LIST

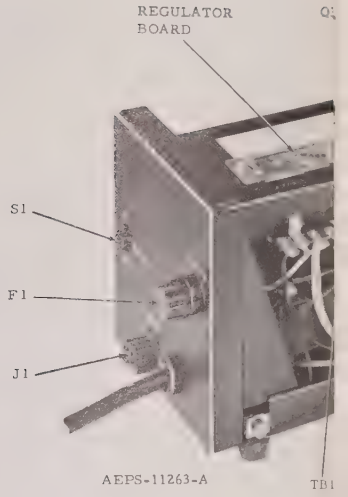
TLN5274A Regulator Board — PL-2257-B

		CAPACITOR, fixed: uF;
C1	8-82905G02	.022 ±10%; 50 V
C2	23-83210A08	100 +150-10%; 25 V
C3, 4	8-82905G02	.022 ±10%; 50 V
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR5	48-82392B03	silicon
		TRANSISTOR: (SEE NOTE)
Q1, 2	48-869170	NPN; type M9170
		RESISTOR, fixed: ±5%; 1/2 W; unless otherwise stated
R1	6-400812	470
R2	6-400459	1.5k
R3	6-400422	33
R4	17-82177B40	200; 5 W
R5, 6	6-5593	470 ±10%; 1 W
R7, 8	6-6411	1k
R9, 10	6-6320	10k ±10% (NOTE: Use is optional; determined at factory)
R11	6-6393	1.2k ±10%
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
VR1	48-83696E01	silicon; Zener type; 6.8 V ±5%

TRN6282A Power Supply Chassis — PL-3349-B

		CAPACITOR, fixed:
C1	23-82464C08	11,000 uF +75-10%; 35 V
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR1, 2	48-82732C07	silicon
CR3, 4	48-82732C10	silicon
		CONNECTOR, receptacle:
J1		includes: 15-10183A52 INSULATOR, 6-contact 29-82335A01 CONTACT, male; 4 req'd. (P/O Model TLN5219A)
		FUSE, cartridge:
F1	65-804908	slow-blow type; 2 A
		LINE CORD:
P1	30-83212F01	includes: ac plug
		TRANSISTOR: (SEE NOTE)
Q3	48-869677	PNP; type M9677
Q4, 5	48-869244	NPN; type M9244
		SWITCH, slide:
S1	40-84622B02	DPST
		TRANSFORMER, power:
T1	25-83594E02	pri: res 2.75 Ohms sec: res 0.11 Ohm
		TERMINAL STRIP:
TB1	31-121700	8 terminals; No. 2 & 7 mtg.
		FUSEHOLDER:
XF1	9-82083C01	extractor post type
NON-REFERENCED ITEMS		
	26-84923B03	HEATSINK
	1-80745B88	HOUSING, power supply

NOTE: Replacement diodes and transistors must be ordered by listed part number only for optimum performance.



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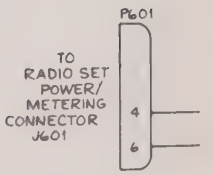
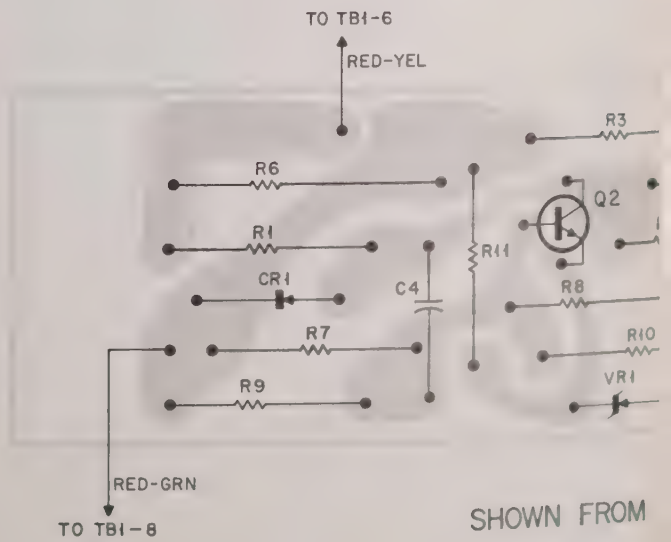


MODEL TABLE

MODEL	SUB-M
TPN1136A	TLN527
	TRN628
	TLN627



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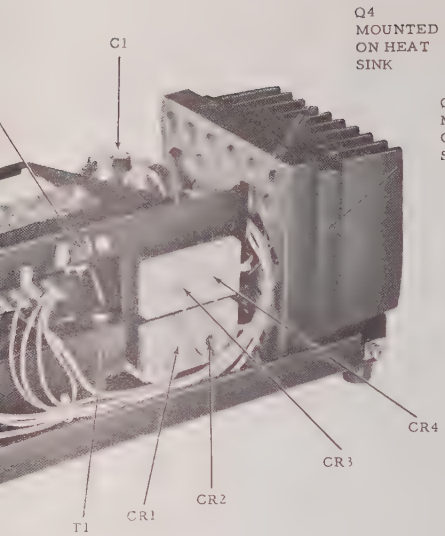
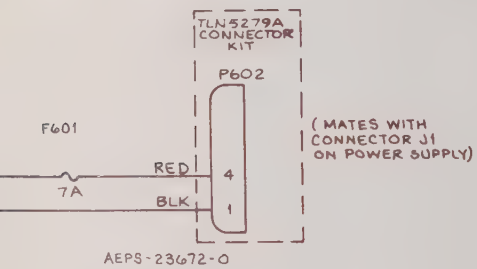
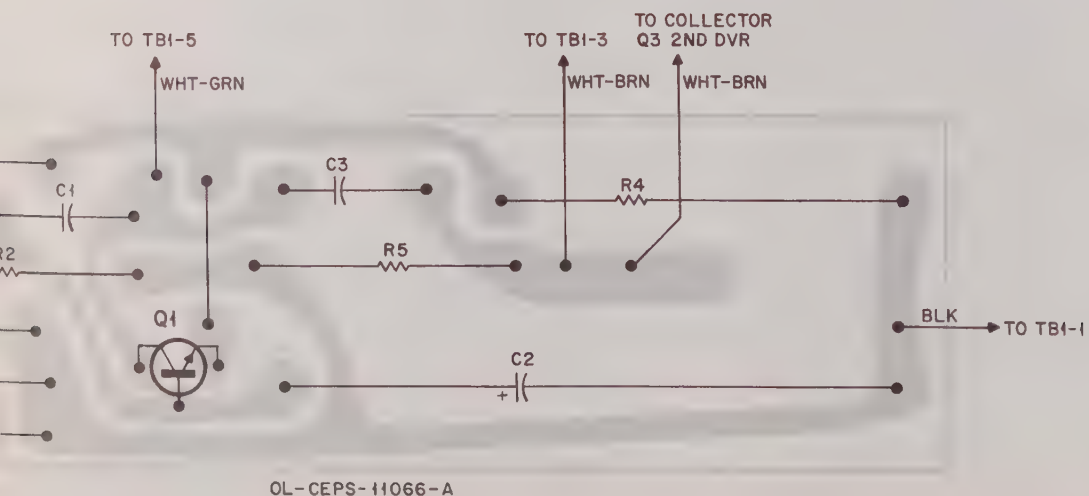


ABLE DETAIL



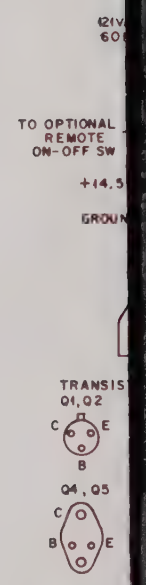
ODEL	VERSION	DESCRIPTION
4A	0	REGULATOR BOARD
2A	0	POWER SUPPLY CHASSIS
9A	0	CONNECTOR KIT

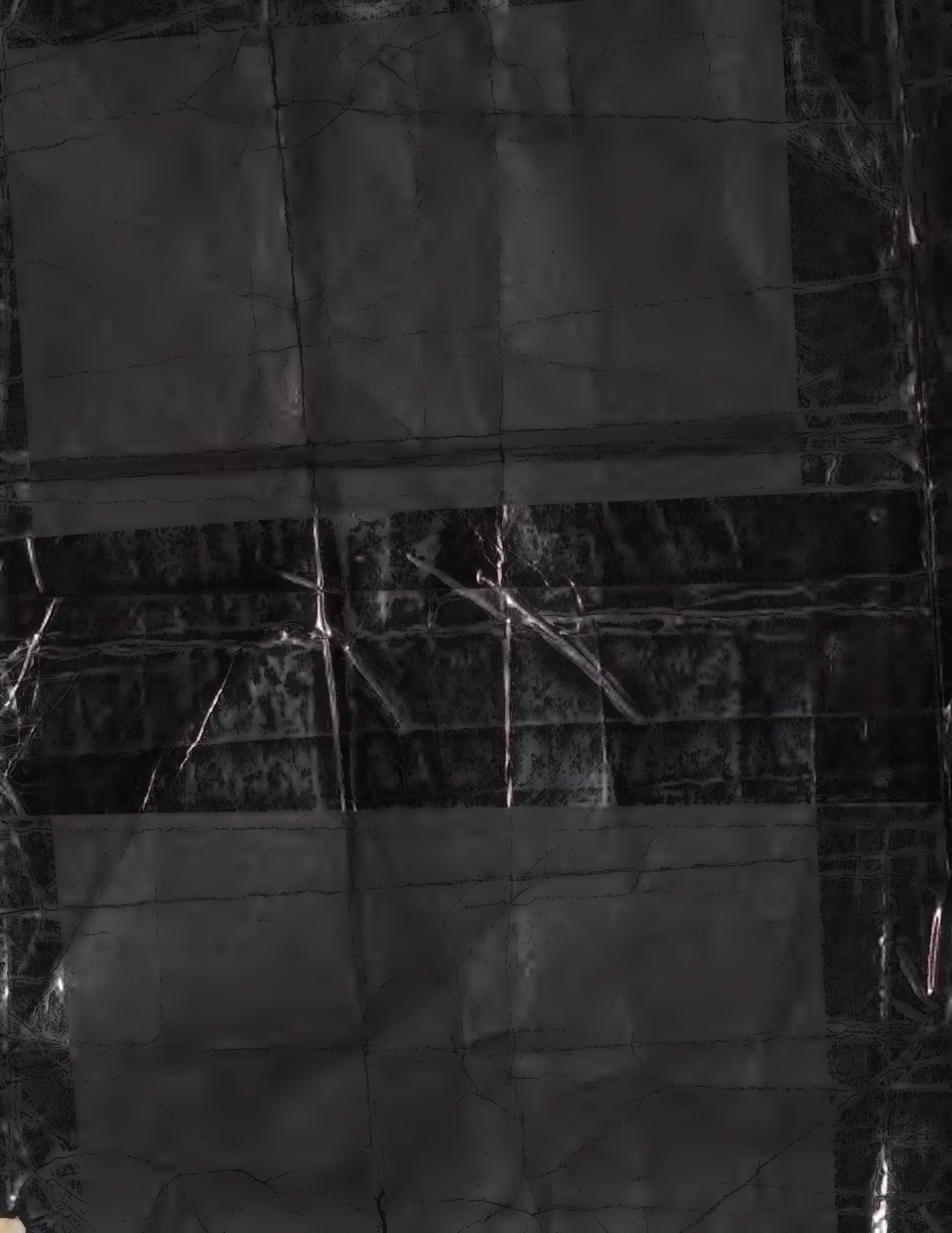
EPS–17211–B



OL-CEPS-11066-A

SOLDER SIDE



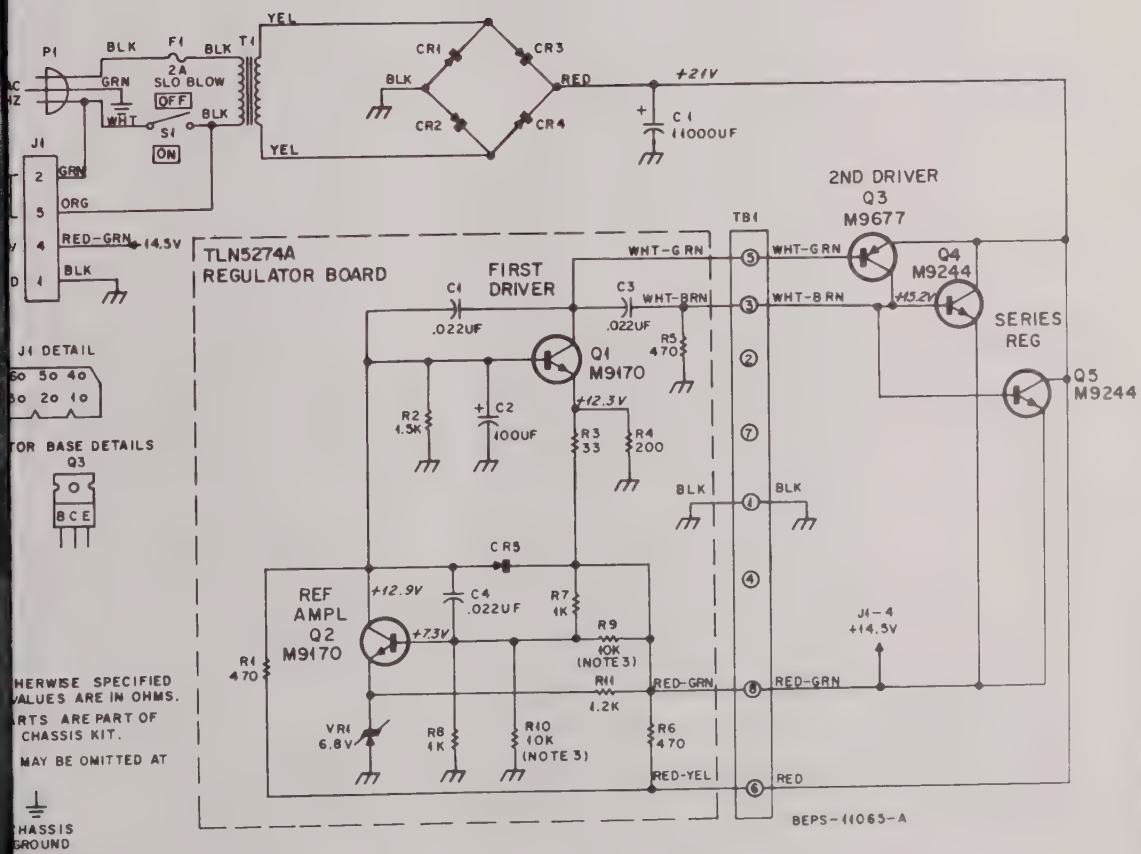


FIXED STATION POWER SUPPLY

MODEL TPN1136A

FUNCTION

Provides the entire radio with regulated +14.5 V DC when used in a 120 V AC primary power fixed installation.

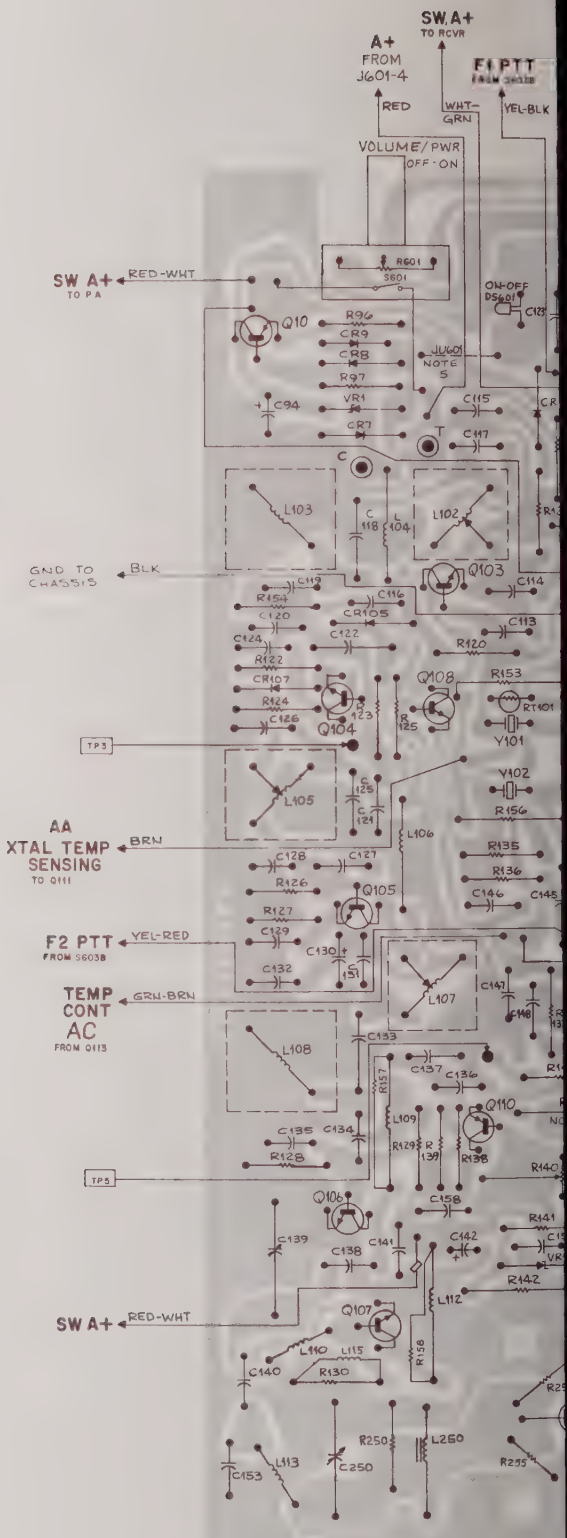


BASE STATION POWER SUPPLY/
RADIO CIRCUIT BOARD DETAIL

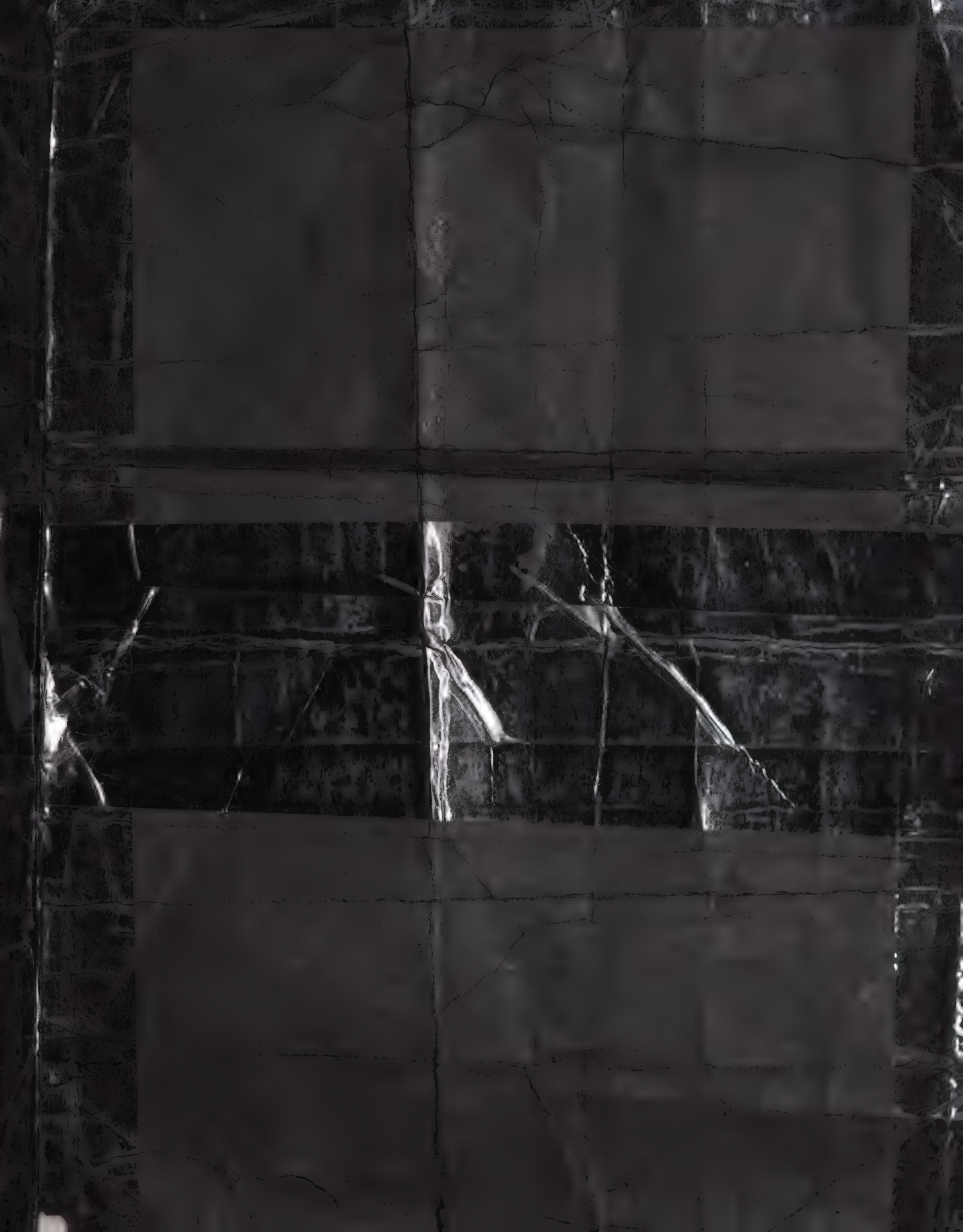
68P81029E96-B
3/31/77-NPC

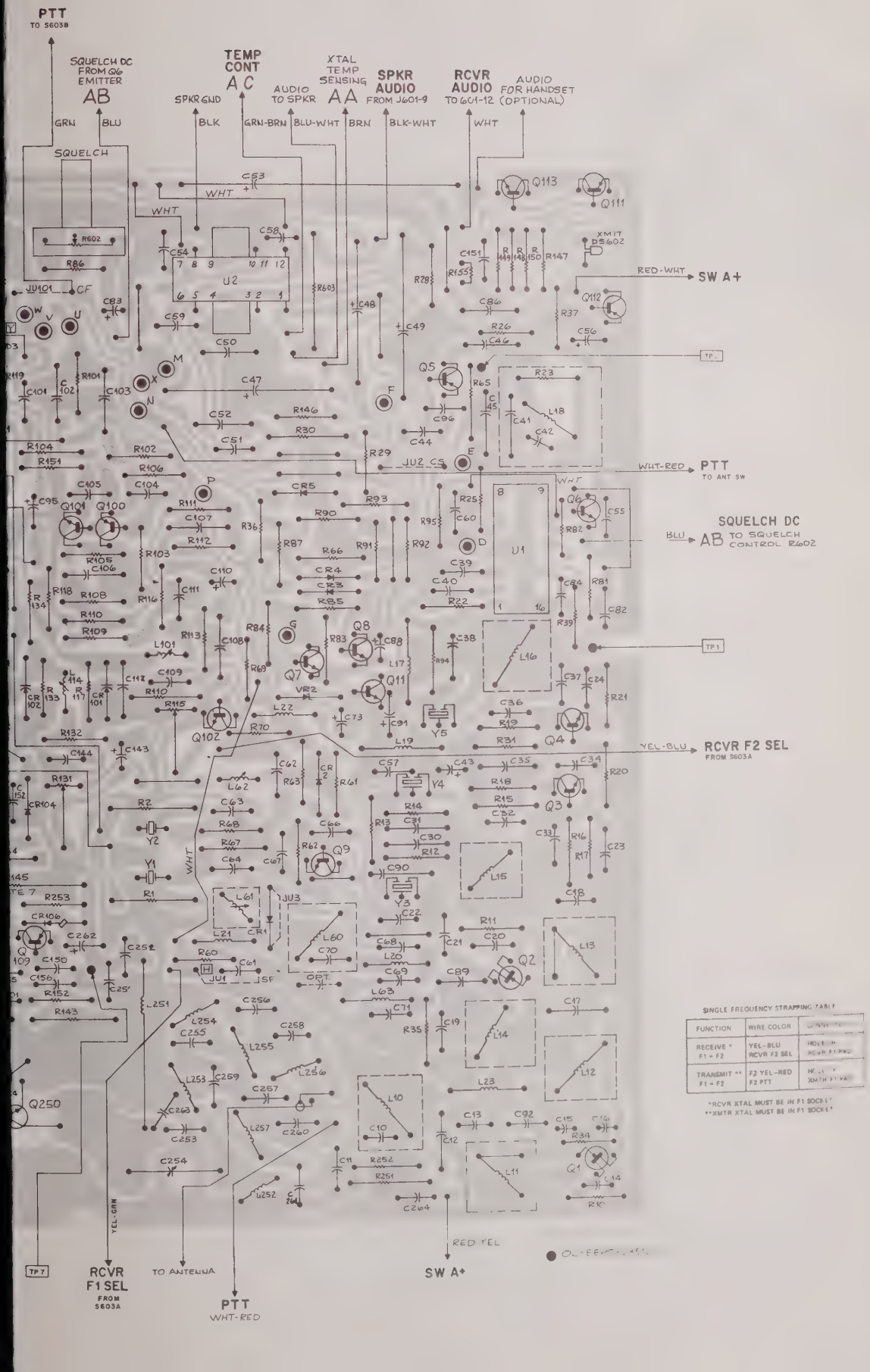
UNIFIED CHASSIS

CIRCUIT BOARD DETAIL



68P81034E51-O
(Sheet 1 of 4)
3/31/77-NPC



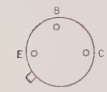

PTT
TO S603B
SQUELCH DC
FROM Q6
EMITTER
AB
GRN
BLU
TEMP
CONT
A C
SPKR GND
BLK
AUDIO
TO SPKR
XTAL
TEMP
SENSING
A A
GRN-BRN
BLU-WHT
SPKR
AUDIO
FROM J601-9
BRN
BLK-WHT
RCVR
AUDIO
TO 601-12
WHT
AUDIO
FOR HANDSET
(OPTIONAL)
SQUELCH
R602
R86
JU101
CF
U2
C53
C54
C58
C59
C50
C83
R603
C48
C49
Q113
Q111
XMIT
DS602
C151
R153
R149
R148
R150
R147
R28
RED-WHT
SW A+
C86
Q112
R37
R26
C46
C56
TP
Q5
R65
C96
R23
C45
C41
L18
C42
C47
C52
R146
R30
C51
R29
C44
JU2
C5
WHT-RED
PTT
TO ANT SW
C101
C102
R101
C103
R119
R104
R151
R102
R106
C104
C105
C95
Q101
Q100
R111
C107
R112
R105
C106
R103
R116
C111
C110
R118
R134
R108
R110
R109
R113
L101
C108
R84
R69
Q7
Q8
R83
C88
L17
Q11
VR2
L22
C73
C91
Y5
R70
Q102
R94
C38
L16
C37
C24
R21
C36
R19
Q4
R31
L19
YEL-BLU
RCVR F2 SEL
FROM S603A
C109
R110
R115
C112
L414
R414
R117
CR101
CR102
R133
R132
C144
C143
R131
CR104
C62
L62
R63
CR2
R61
C57
Y4
C43
C35
C34
R18
R15
C32
R20
Q3
R14
R13
C31
C30
R12
C90
Y3
C33
R16
R17
C23
C18
L15
R2
C63
R68
R67
C64
C66
R62
Q9
C67
Y2
Y1
R1
WHT
L61
CR1
JU3
L21
L60
C70
ORT
C22
C68
L20
C69
C21
R11
C20
Q2
C89
L13
L63
C71
R35
C19
L14
C17
L12
L23
L10
C10
C12
C13
C92
C15
C16
R34
Q1
L11
C11
R252
R251
C264
C14
R40
R253
CR106
Q109
C262
C150
C156
R152
C252
C251
R60
C61
JU1
SF
R143
L251
L254
C256
C255
C258
L255
L256
L253
C259
C257
C263
C253
C260
C254
L257
U252
C261
Q250
TP7
YEL-GRN
RCVR
F1 SEL
FROM
S603A
TO ANTENNA
PTT
WHT-RED
RED YEL
SW A+
SINGLE FREQUENCY STRAPPING TABLE
FUNCTION
WIRE COLOR
RECEIVE *
F1 = F2
YEL-BLU
RCVR F2 SEL
TRANSMIT **
F1 = F2
F2 YEL-RED
F2 PTT
*RCVR XTAL MUST BE IN F1 SOCKET
**XMTR XTAL MUST BE IN F1 SOCKET

PUSH-PIN TABLE

PIN	WIRE COLOR	FUNCTION
	RECEIVER	
A	YEL-GRN	RCVR F1 SELECT FROM S603*
B	YEL-BLU	RCVR F2 SELECT FROM S603*
C	RED-WHT	SWITCHED A + TO PL BOARD**
D	WHT-RED	PL TONE TO PL BOARD DECODER INPUT**
E	YEL-WHT	AUDIO TO PL BOARD AUDIO HIGH-PASS FILTER INPUT**
F	YEL-BLU	AUDIO FROM PL BOARD AUDIO HIGH-PASS FILTER OUTPUT**
G	GRAY	SQUELCH CONTROL FROM PL BOARD SQUELCH SWITCH**
	TRANSMITTER	
M	GRN-BRN	PTT TO PL BOARD**
P	BRN-ORG	PL TONE FROM PL BOARD ENCODER OUTPUT**
T	BLK	PL GROUND
U	WHT	MICROPHONE AUDIO HIGH
V	SHIELD	MICROPHONE AUDIO LOW
W	BLK	MICROPHONE PTT GROUND
X	RED	MICROPHONE PTT

*USED IN 2-FREQUENCY MODELS ONLY
**USED IN PL AND DPL MODELS ONLY

TRANSISTOR BASE DETAILS
(LEAD SIDE)

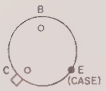


M9657 (Q106)

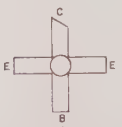
M9640 (Q113)

ALL OTHERS

M9940 (Q1)
M9943 (Q2)



M9859 (Q107)

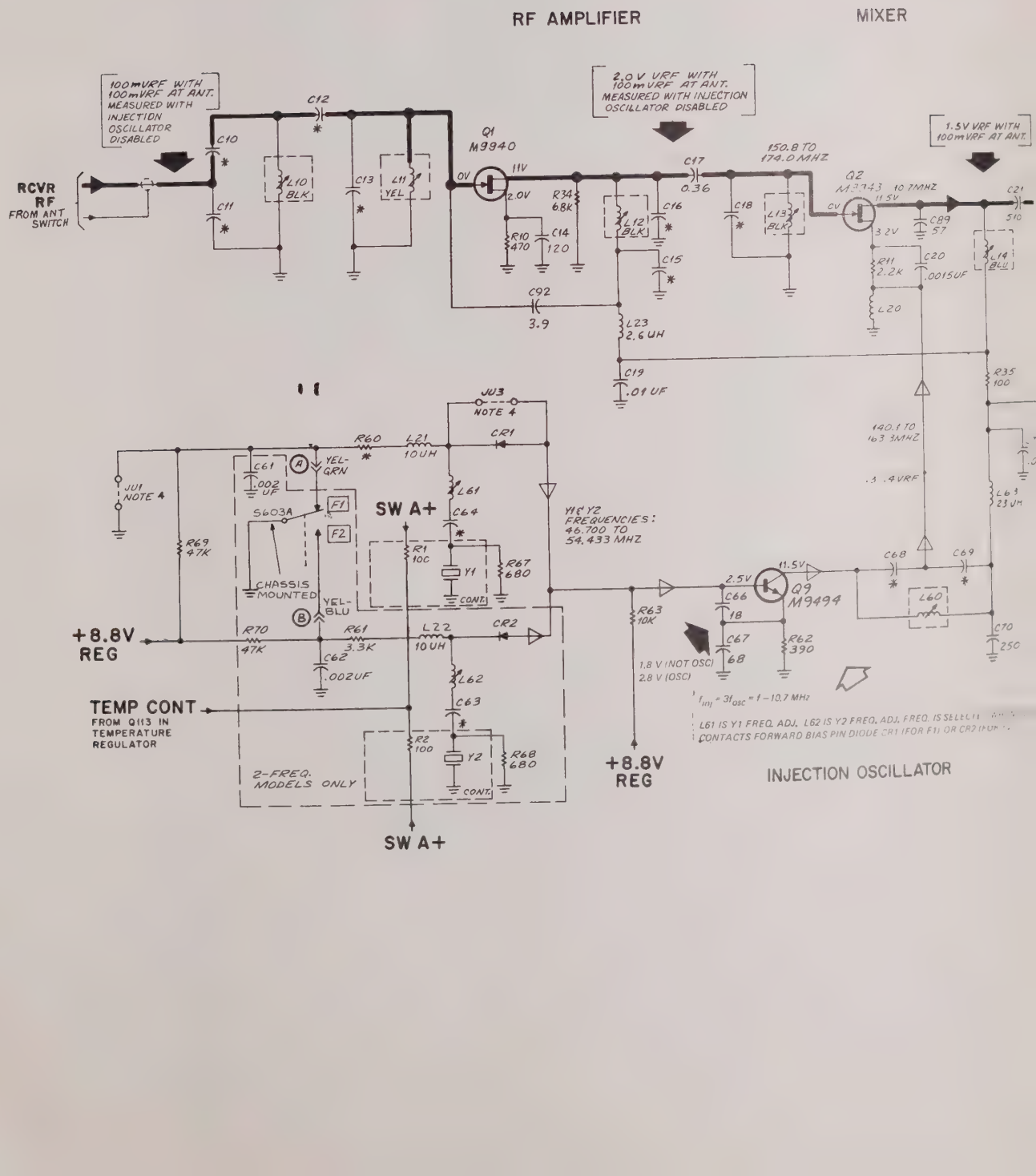


M9860 (10 W)
M9958 (20 W) (Q250)

NOTE:
SOME COMPONENTS SHOWN ARE NOT USED IN SOME RADIO MODELS. SEE PARTS LIST FOR SPECIFIC INFORMATION.

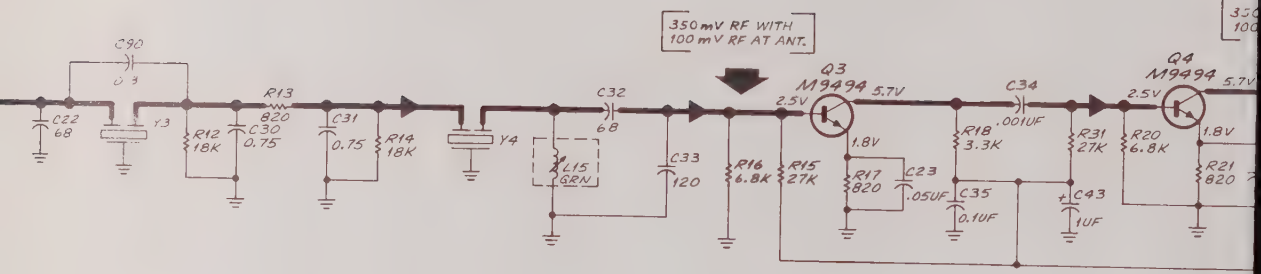
JUMPER TABLE

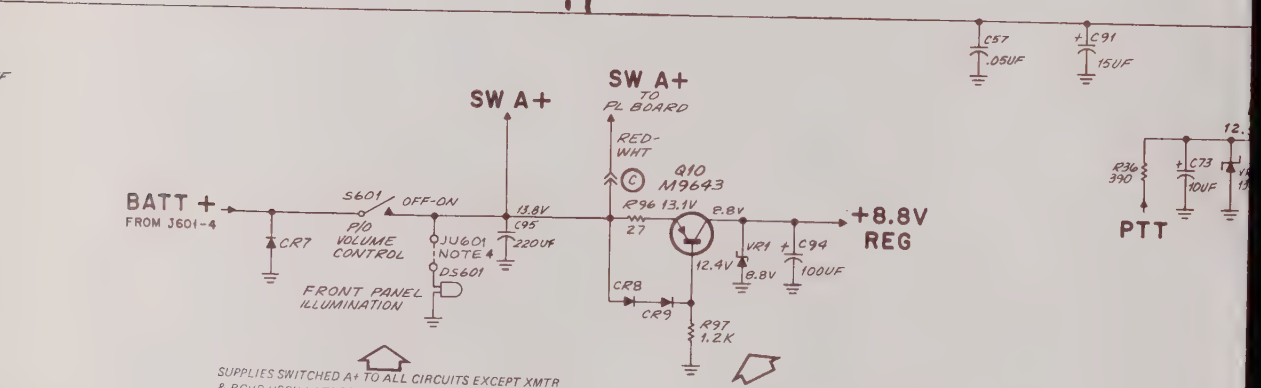
JUMPER NUMBER	IN	OUT
JU1	SINGLE-FREQUENCY RECEIVER MODELS	TWO-FREQUENCY RECEIVER MODELS
JU2	CARRIER SQUELCH MODELS	"PRIVATE-LINE" TONE-CODED SQUELCH MODELS
JU3	SINGLE-FREQUENCY RECEIVER MODELS (CR1 OUT)	TWO-FREQUENCY RECEIVER MODELS (CR1 IN)
JU101	SINGLE-FREQUENCY TRANSMITTER MODELS	TWO-FREQUENCY TRANSMITTER MODELS
JU601	ALL MODELS	OPTIONAL (DISABLES PWR ON LAMP)


RF AMPLIFIER
MIXER
100mVRF WITH 100mVRF AT ANT. MEASURED WITH INJECTION OSCILLATOR DISABLED
2.0 V VRF WITH 100mVRF AT ANT. MEASURED WITH INJECTION OSCILLATOR DISABLED
1.5V VRF WITH 100mVRF AT ANT.
RCVR RF FROM ANT SWITCH
C10
C11
C12
C13
L10 BLK
L11 YEL
Q1 M9940
11V
0V
2.0V
R34 6.8K
R10 470
C14 120
C15
C16
C17 0.36
L12 BLK
150.8 TO 174.0 MHZ
C18
L13 BLK
Q2 M3743
10.7MHZ
11.5V
3.2V
C89 57
C21 510
R11 2.2K
C20 .0015UF
L14 BLU
L20
C92 3.9
L23 2.6 UH
C19 .01 UF
R35 100
JU3 NOTE 4
CR1
R60
L21 10UH
140.1 TO 163.3MHZ
.3 .4VRF
L63 23 UH
JU1 NOTE 4
C61 .002 UF
YEL-GRN
S603A
F1
F2
SW A+
L61
C64
R1 10C
Y1
CONT.
R67 680
Y1 & Y2 FREQUENCIES: 46.700 TO 54.433 MHZ
R69 47K
CHASSIS MOUNTED
YEL-BLU
+8.8V REG
R70 47K
R61 3.3K
L22 10UH
CR2
C62 .002UF
L62
C63
TEMP CONT
FROM Q113 IN TEMPERATURE REGULATOR
R2 100
Y2
R68 680
2-FREQ. MODELS ONLY
SW A+
11.5V
2.5V
Q9 M9494
C66 18
C67 68
R62 390
R63 10K
C68
C69
L60
C70 250
1.8 V (NOT OSC)
2.8 V (OSC)
$f_{inj} = 3f_{osc} = 1 - 10.7$ MHz
L61 IS Y1 FREQ. ADJ. L62 IS Y2 FREQ. ADJ. FREQ. IS SELECTED
CONTACTS FORWARD BIAS PIN DIODE CR1 (FOR F1) OR CR2 (FOR
+8.8V REG
INJECTION OSCILLATOR

4-POLE 10.7 MHZ
CRYSTAL FILTER

10.7 MHZ IF AMPLIFIER





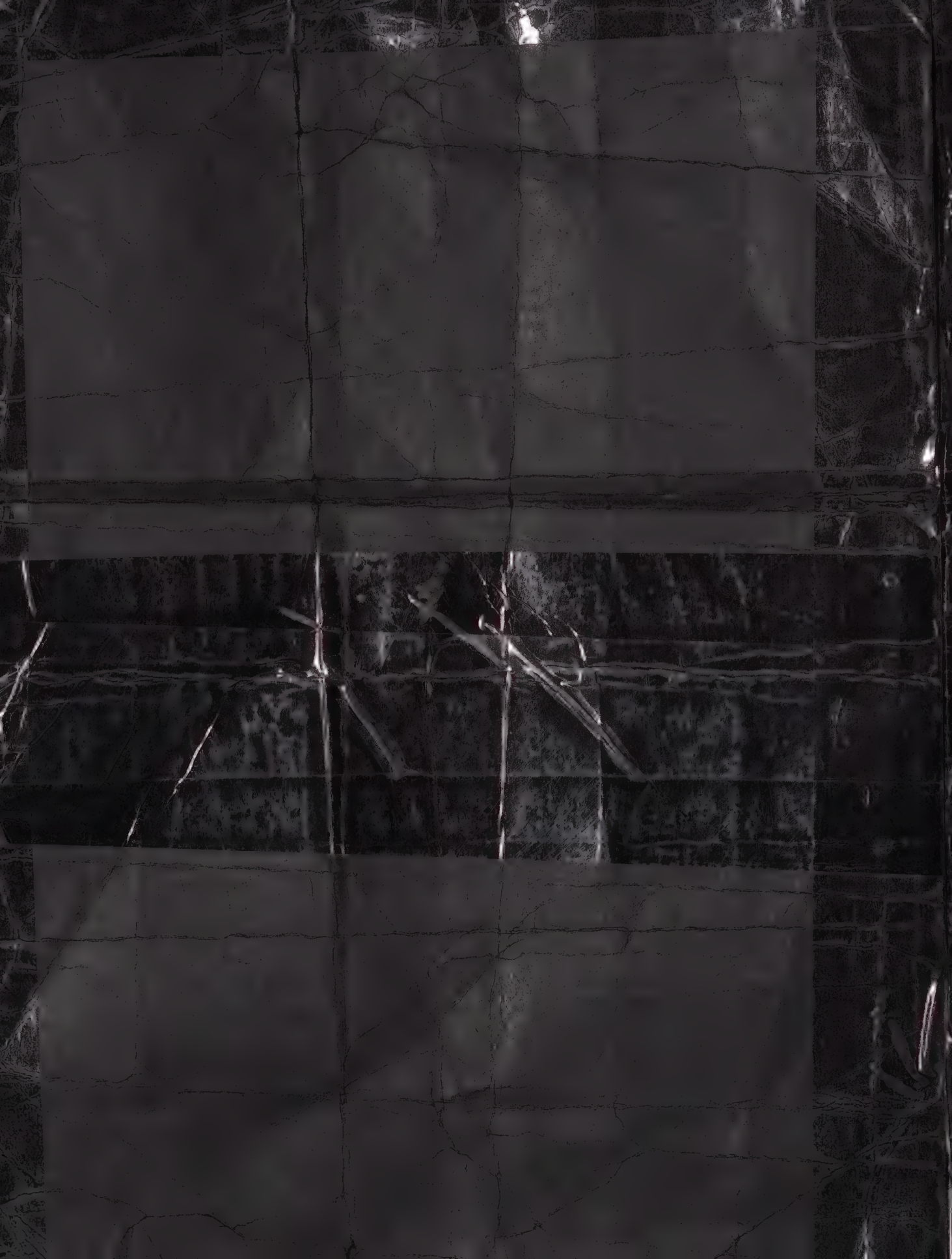
SUPPLIES SWITCHED A+ TO ALL CIRCUITS EXCEPT XMTR & RCVR OSCILLATORS, & SQUELCH CIRCUIT. CR7 PROVIDES REVERSE POLARITY PROTECTION.

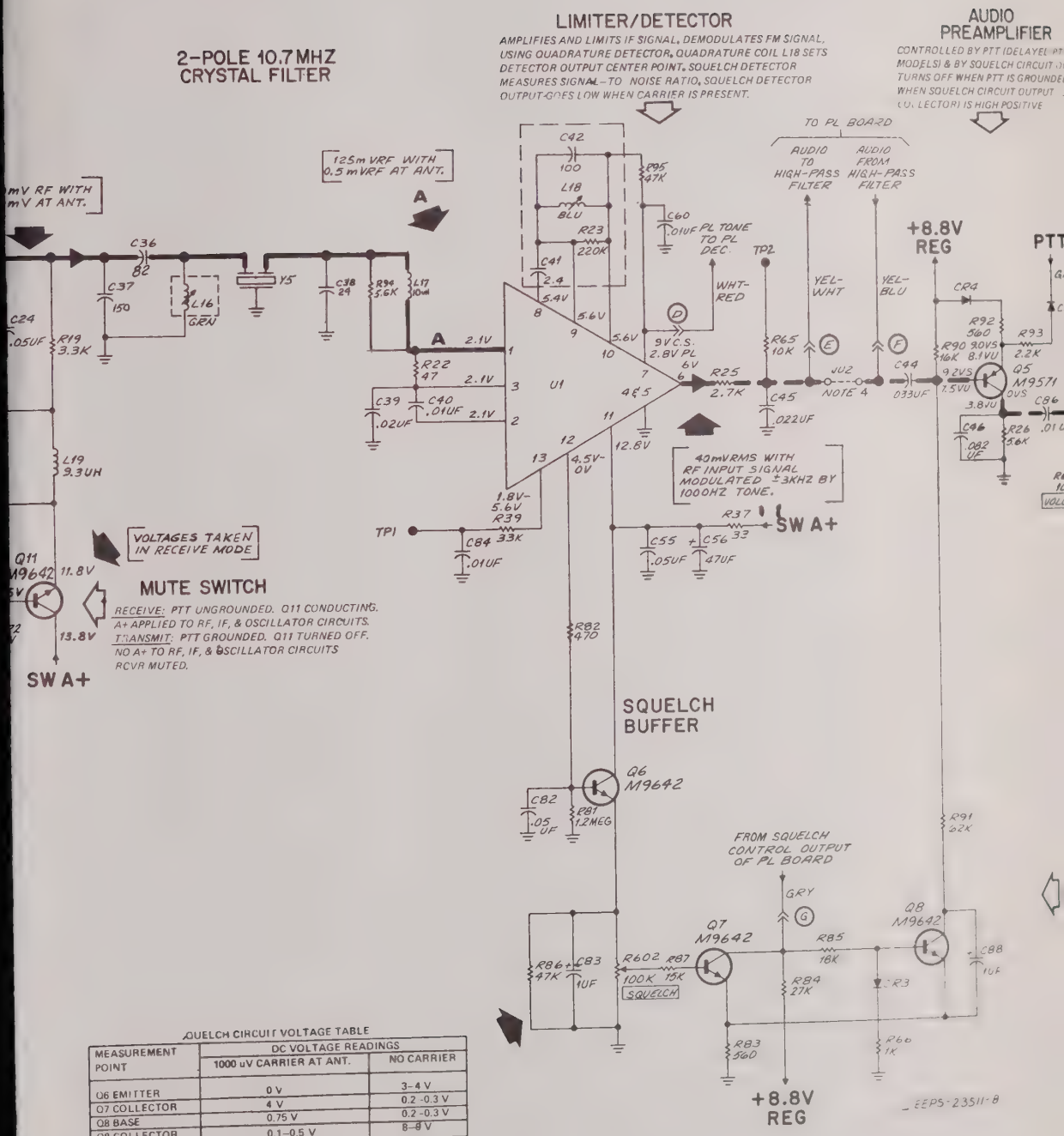
DC DISTRIBUTION

SUPPLIES REGULATED +8.8 V TO XMTR & RCVR OSCILLATORS, SQUELCH CIRCUIT & AUDIO PREAMPLIFIER.
Q10 PROVIDES CURRENT REGULATION
VR1 PROVIDES VOLTAGE REGULATION.

VOLTAGE REGULATOR

CAUTION
WHEN S601 IS ON, DC POWER IS APPLIED AT ALL CIRCUITS IN THE RADIO





SQUELCH CIRCUIT VOLTAGE TABLE

MEASUREMENT POINT	DC VOLTAGE READINGS	
	1000 uV CARRIER AT ANT.	NO CARRIER
Q6 EMITTER	0 V	3-4 V
Q7 COLLECTOR	4 V	0.2 -0.3 V
Q8 BASE	0.75 V	0.2 -0.3 V
Q8 COLLECTOR	0.1-0.5 V	8-8 V

NOTES

1. COMPONENTS MARKED WITH AN ASTERISK HAVE DIFFERENT VALUES (OR TYPE NUMBER) ON DIFFERENT RADIO MODELS. SEE UNIFIED CHASSIS PARTS LIST

2. UNLESS OTHERWISE NOTED, RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES ARE IN PICOFARADS

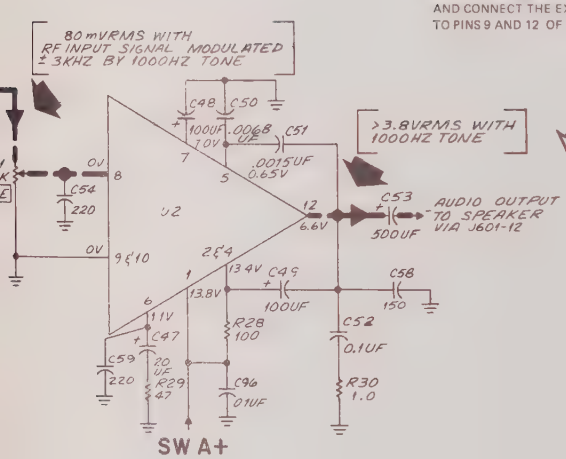
3 UNLESS OTHERWISE NOTED, DC VOLTAGES ARE MEASURED WITH A 20,000 OHM–PER VOLT METER, AND RF VOLTAGES ARE MEASURED WITH AN RF VOLTMETER
U2 VOLTAGES MEASURED WITH VOLUME CONTROL FULLY COUNTERCLOCKWISE (MINIMUM VOLUME)

S = RCVR SQUELCHED
U = RCVR UNSQUELCHED

4. JUMPER CONNECTIONS ARE SHOWN IN THE FOLLOWING TABLE

JUMPER NUMBER	IN	OUT
JU1	SINGLE FREQUENCY RECEIVER MODELS	TWO FREQUENCY RECEIVER MODELS
JU2	CARRIER SQUELCH AND DIGITAL "PRIVATE LINE" MODELS	TONE CODED "PRIVATE–LINE" SQUELCH MODELS
JU3	SINGLE FREQUENCY RECEIVER MODELS	TWO FREQUENCY RECEIVER MODELS
JU101	SINGLE FREQUENCY TRANSMITTER MODELS	TWO FREQUENCY TRANSMITTER MODELS
JU601	ALL MODELS	OPTIONAL (DISABLES PWR ON LAMP)

5. THE RADIO IS SUPPLIED WITH A JUMPER BETWEEN PINS 9 AND 12 OF ACCESSORY PLUG P601. IF AN EXTERNAL SPEAKER IS TO BE USED, REMOVE THIS JUMPER AND CONNECT THE EXTERNAL SPEAKER TO PINS 9 AND 12 OF P601



AUDIO POWER AMPLIFIER

>3.8VRMS WITH 1000HZ TONE

AUDIO POWER OUTPUT = 3 WATTS, DRIVES SPKR

SQUELCH CIRCUIT

ANS AUDIO PREAMPLIFIER Q5 ON & OFF.

CARRIER SQUELCH OPERATION

WITH NO CARRIER DETECTED, Q8 COLLECTOR IS HIGH POSITIVE, KEEPING Q5 TURNED OFF. WHEN CARRIER IS DETECTED, U1 SQUELCH DETECTOR OUTPUT CAUSES Q6 EMITTER AND Q7 BASE TO GO LOW. WHEN Q7 BASE GOES LOW ENOUGH, SCHMITT TRIGGER Q7–Q8 CHANGES STATE. Q8 COLLECTOR GOES LOW AND Q5 TURNS ON.

TONE–CODED OR DIGITAL "PRIVATE–LINE" OPERATION:

WHEN NO PL CODE IS DETECTED, Q8 BASE IS HELD LOW BY PL BOARD SQUELCH OUTPUT, Q8 COLLECTOR IS HIGH POSITIVE, KEEPING Q5 OFF. WHEN PL CODE IS DETECTED, PL BOARD SQUELCH CONTROL OUTPUT GOES HIGH, Q8 COLLECTOR GOES LOW, AND Q5 TURNS ON.

LEGEND:

= THEORY OF OPERATION DATA

= MAINTENANCE DATA

= PRIMARY RF SIGNAL FLOW

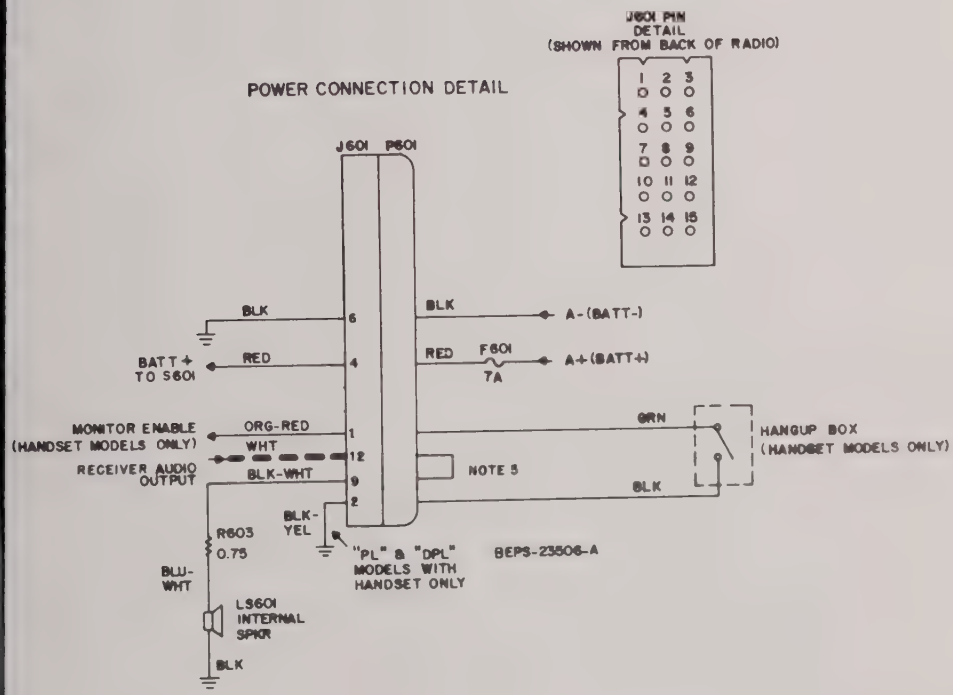
= SECONDARY RF SIGNAL FLOW

= PRIMARY AUDIO SIGNAL FLOW

UNIFIED CHASSIS RECEIVER SECTION

FUNCTION

Amplifies, mixes, filters, and demodulates received rf energy from antenna (via antenna switch) and provides an amplified audio signal to the speaker.



PARTS LIST

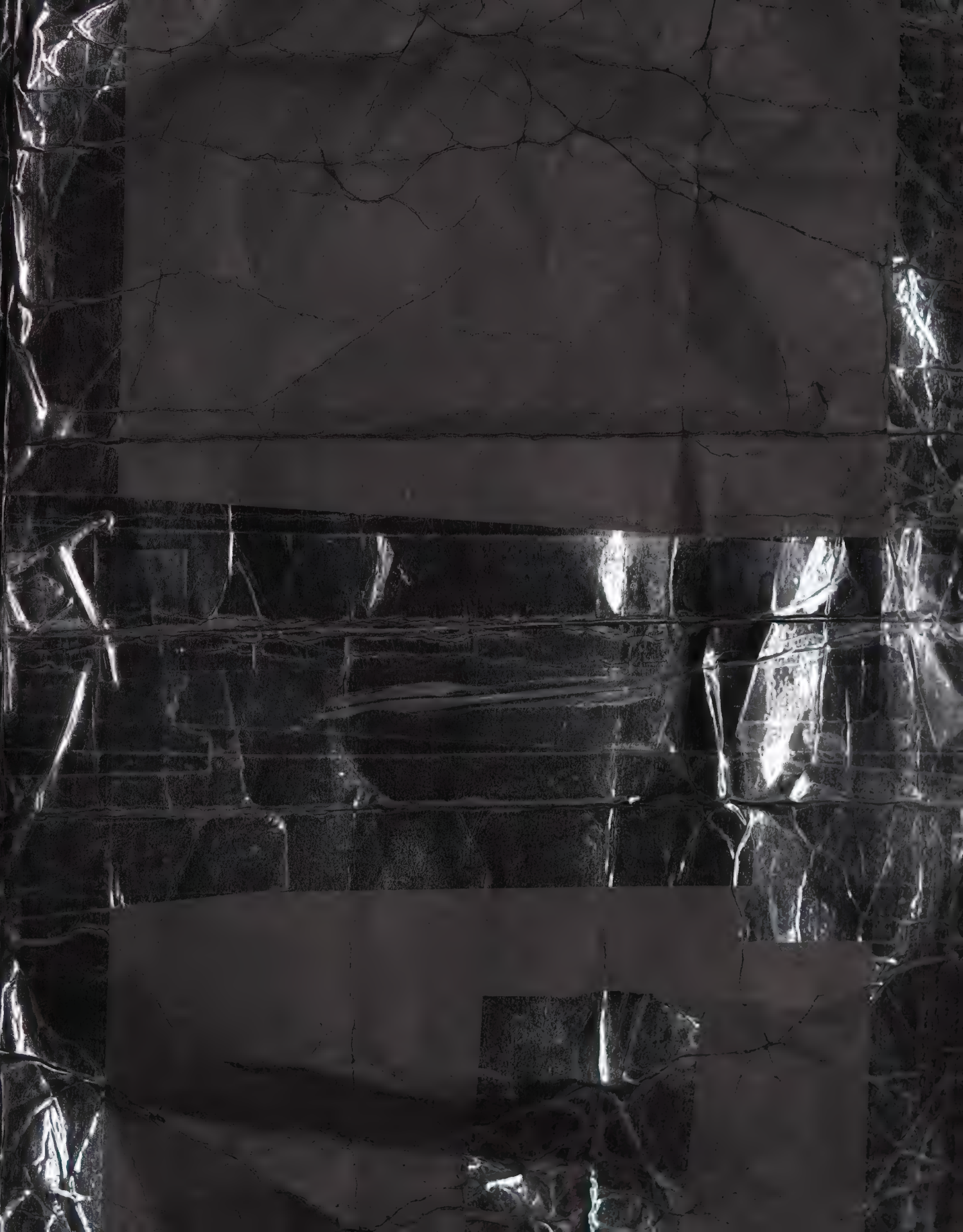
Unified Chassis Models:

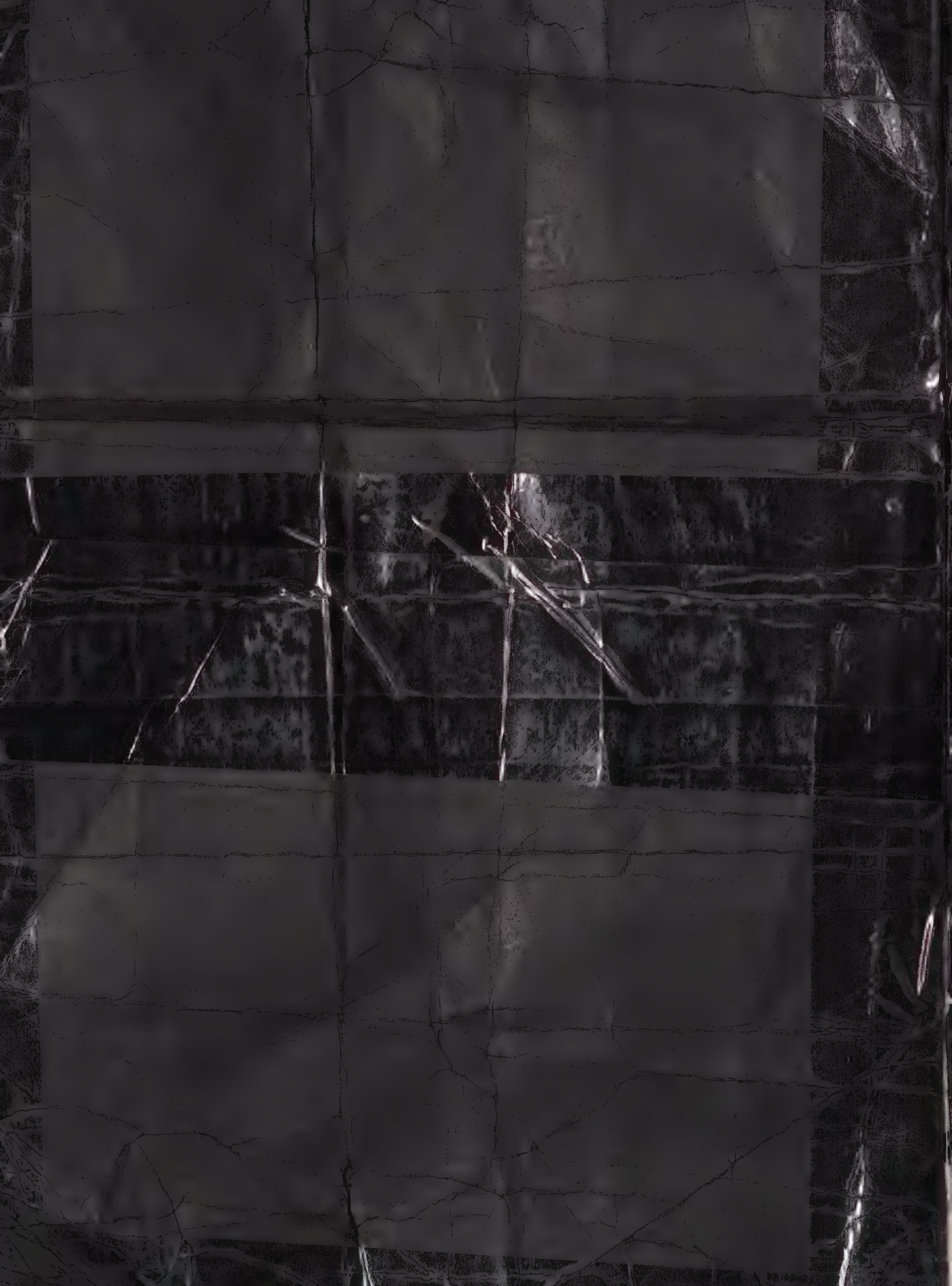
TUD2032AB (150.8-162 MH
TUD2033AB (162-174 MHz)
TUD2032AH (150.8-162 MH
TUD2033AH (162-174 MHz)
TUD2042AB (150.8-162 MH
TUD2043AB (162-174 MHz)
TUD2042AH (150.8-162 MH
TUD2043AH (162-174 MHz)

L
M = 150.8-1
H = 162-174
A = 10 Watt
B = 20 Watt

Receiver components are n
Exciter components are nu
Power Amplifier componen
Other components are numb

REFERENCE SYMBOL	MOTOROLA PART NO.
C10 (M)	21-84713A30
C10 (H)	21-84713A35
C11 (M)	21-82133G39
C11 (H)	21-82133G83
C12 (M)	21-864519
C12 (H)	21-82450B29
C13 (M)	21-84493B40
C13 (H)	21-863466
C14	21-82877B15
C15 (M)	21-82240K05
C15 (H)	21-84713A31
C16 (M)	21-84713A35
C16 (H)	21-84713A46
C17	21-842041
C18 (M)	21-82133G76
C18 (H)	21-863466
C19	21-82428B59
C20	21-82187B18
C21	21-845214
C22	21-82610C30
C23, 24	21-82372C04
C30, 31	21-82450B06
C32	21-82610C30
C33	21-82610C09
C34	21-82187B20
C35	21-82372C01
C36	21-82610C20
C37	21-82204B54
C38	21-82133G46
C39	21-82428B26
C40	21-82428B59
C41	21-82450B14
C42	21-82358G12
C43	23-84665F04
C44	8-82905G08
C45	8-84496D07
C46	8-82905G45
C47	23-82601A03
C48, 49	23-84669A19
C50	8-84496D08
C51	21-82187B18
C52	8-84496D05
C53	23-83210A19
C54	21-83596E10
C55	21-82372C04
C56	23-84538G06
C57	21-82372C04
C58	21-82877B05
C59	21-83596E10
C60	21-82428B59
C61, 62	21-82428B25
C63 (M), 64 (M)	21-82355B15
C63 (H), 64 (H)	21-125929
C66	21-865942
C67	21-82610C30
C68 (M)	21-83406D15
C68 (H)	21-864746
C69 (M)	21-82610C02





	DESCRIPTION

z) ——— 1 freq., 10 watt
z) ——— 2 freq., 10 watt
z) ——— 1 freq., 20 watt
z) ——— 2 freq., 20 watt

EGEND
62 MHz models only
MHz models only
models only
models only PL-5332-O

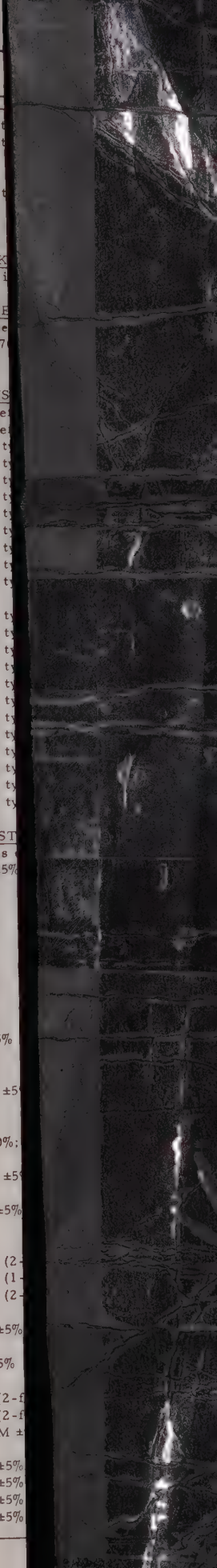
umbered 1-99
mbered 100-199
ts are numbered 200-299
ered 600-699

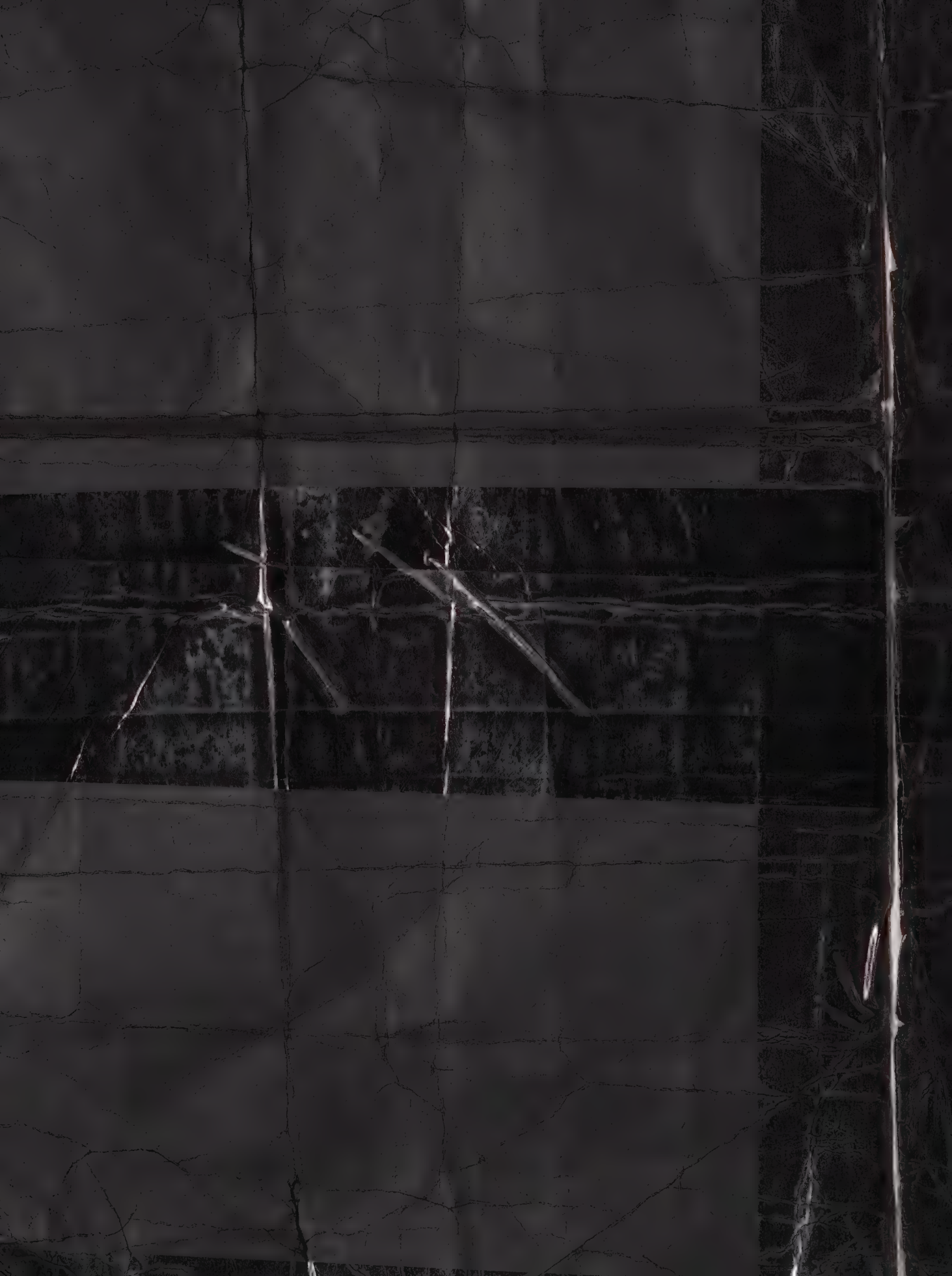
	CAPACITOR, fixed: pF ±5%; 500 V; unless otherwise stated
	10; N150
	9; N150
	36; N150
	33; N150
	0.56 ±10%
	0.51
	6.8; N150
	5; N150
	120; N150
	50; N150
	43; N150
	9; N150
	7 ±0.25 pF; N150
	0.36
	6.8 ±.2%; N150
	5; N150
	.01 uF +80-20%; 200 V
	.0015 uF ±10%; 200 V
	510
	68; 200 V
	.05 uF +80-20%; 25 V
	0.75 ±10%; 500 V
	68; 200 V
	120; 200 V
	.001 uF ±10%; 200 V
	0.1 uF +80-20%; 25 V
	82; NP0
	150 ±10%
	24
	.02 uF +80-20%; 200 V
	.01 uF +80-20%; 200 V
	2.4
	100; N080
	1 uF +150-0%; 35 V
	.033 uF ±10%; 50 V
	.022 uF ±10%; 100 V
	.082 uF ±10%; 50 V
	20 uF; 25 V
	100 uF +150-10%; 20 V
	.0068 uF
	.0015 uF ±10%; 200 V
	.1 uF
	500 uF ±10%; 15 V
	220 ±20%; 200 V
	.05 uF +80-20%; 25 V
	47 uF
	.05 uF +80-20%; 25 V
	150
	220 ±20%; 200 V
	.01 uF +80-20%; 200 V
	.002 uF ±20%; (2-freq. only)
	24; N750
	15; N750
	18; N470
	68; 200 V
	9; N150
	6; N150
	43; 200 V

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C69(H)	21-855809	33; N150
C70	21-82877B36	250; N750
C71	21-82372C04	.05 uF +80-20%; 25 V
C73	23-84665F01	10 uF
C82	21-82372C04	.05 uF +80-20%; 25 V
C83	23-84665F04	1 uF +150-0%; 35 V
C84	21-82428B59	.01 uF +80-20%; 200 V
C86	8-84496D03	.01 uF ±10 %; 250 V
C88	23-84665F04	1 uF +150-0%; 35 V
C89	21-82610C47	57; 100 V
C90	21-82450B26	0.3 ±10%
C91	23-84538G04	15 uF
C92	21-83406D76	3.9 ±0.25 pF; NP0
C94	23-84665F03	100 uF; 50 V
C95	23-84665F06	220 uF; 25 V
C101	21-83596E10	220 ±20%
C102, 103	8-82905G08	.033 uF ±10%; 50 V
C104, 105	21-83596E10	220 ±20%
C106	8-82905G10	.015 uF ±10%; 50 V
C107	21-82428B15	.005 uF
C108	8-82905G21	.018 uF ±10%; 100 V
C109	21-82187B18	.0015 uF ±10%
C110	23-84665F04	1 uF +150-0%; 65 V
C111	21-850510	470 ±10%; 300 V
C112 (M)	21-82204B51	62; N330
C112 (H)	21-82610C21	62; N220
C113	21-84494B52	91
C114	21-84494B15	300
C115, 116	21-82428B59	.01 uF +80-20%; 200 V
C117 (M)	21-82133G39	36; N150
C117 (H)	21-82133G75	30; N150
C118	21-82450B29	.51
C119 (M)	21-83406D18	47
C119 (H)	21-82133G39	36
C120	21-82204B54	100
C121	21-82187B20	.001 uF ±10%; 100 V
C122	21-82450B10	4.3
C123	21-83596E10	220 ±20%
C124, 125, 126	21-82428B59	.01 uF +80-20%; 200 V
C127 (M)	21-82610C03	47
C127 (H)	21-83406D42	43
C128 (M)	21-82204B54	150
C128 (H)	21-82610C44	100
C129	21-83596E10	220 ±20%
C130	21-84538G04	15 uF
C131 (M)	21-82133G22	8 ±.5 pF; NP0
C131 (H)	21-82133G26	6 ±.5 pF; NP0
C132	21-83596E10	220 ±20%
C133	21-82450B29	.51
C134 (M)	21-82133G21	10 ±.5 pF; NP0
C134 (H)	21-82133G22	8 ±.5 pF; NP0
C135	21-82133G41	4.7 ±.25 pF; NP0
C136	21-82204B06	100 ±10%; N1500
C137	21-82372C04	.05 uF +80-20%; 25 V
C138 (M)	21-83406D69	30
C138 (H)	21-83406D81	20
C139	20-83201B02	var: 8-60 pF
C140	21-84494B32	20
C141	21-83596E10	220 ±20%
C142	23-84665F01	10 uF +100-0%; 35 V
C143	23-84465F04	1 uF +150-0%; 35 V
C144	21-850510	470 ±10%; 300 V
C145 (M)	21-82204B51	62; N330
C145 (H)	21-82610C21	62; N220
C146	21-84494B52	91
C147	21-84494B15	300
C148	21-82428B59	.01 uF +80-20%; 200 V
C150	21-83596E10	220 ±20%
C151	21-82372C04	.05 uF +80-20%; 25 V
C152	21-83596E10	220 ±20%
C153 (M, A)	21-83406D70	6 ±.25 NP0
C153 (H, A)	21-83406D84	6.8 ±.25 NP0
C155	21-83596E10	220 ±20%
C156	21-82372C04	.05 uF +80-20%; 25 V
C250 (M, A)	20-83201B03	var 2-10
C250 (H, A)	20-83201B02	var 8-60
C250 (B)	20-83201B02	var 8-60
C251	21-83596E10	220 ±20%
C252	21-82372C04	.05 uF +80-20%; 25 V
C253 (A)	21-84494B36	15
C253 (B)	21-867844	4 ±.25
C254	20-83201B02	var 8-60 pF

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C255 (M)	21-83406D79	18; N150
C255 (H)	21-83406D97	15; NP0
C256 (M)	21-83406D82	36; NP0
C256 (H)	21-83406D69	30; NP0
C257 (M)	21-83406D71	33; NP0
C257 (H)	21-83406D68	27; NP0
C258 (M)	21-83406D79	18; N150
C258 (H)	21-83406D97	15; NP0
C259	21-83406D79	18; N150
C260	21-82204B06	100 ±10%; 500 V
C261	21-83406D79	18; N150
C262	23-84538G04	15 uF
C263 (A)	21-887845	3 ±.5%
C263 (B)		NOT USED
		DIODE: (SEE NOTE 1)
CR1, 2	48-83510F03	silicon; PIN type (2-freq. only)
CR3, 4, 5, 8, 9	48-83654H01	silicon
CR7	48-82466H13	silicon
CR101	48-82190H13	varactor
CR102	48-82190H13	varactor; (2-freq. only)
CR103, 106, 107	48-83654H01	silicon
CR104	48-83654H01	silicon; (2-freq. only)
CR105	48-82139G01	germanium
CR250	48-83510F04	silicon
		LAMP:
DS601, 602	65-83376K01	type GE#73; 14 V
		FUSE:
F601	65-20404	3 A; 250 V (10-watt models)
	or 65-86099	7 A; 32 V (25-watt models)
		CONNECTOR, receptacle:
J601		includes: 15-83292K01 SHELL; 29-84706E06 TERMINAL, female, 4 req'd.
J602	9-82442E09	female, single contact
		COIL, RF:
L10, 12, 13	24-84972A11	3-1/2 turns; coded BLK
L11	24-84972A01	2-1/2 turns; coded BLK
L14	24-84419D02	22-1/2 turns
L15, 16	24-84419D03	33-1/2 turns
L17	24-82549D25	10 uH
L18	24-84419D04	22-1/2 turns
L19	24-82835G20	9.3 uH
L20	24-82723H04	0.29 uH
L21, 22	24-82723H07	10 uH; (2-freq. only)
L23	24-82835G08	choke; 2.6 uH
L60	24-84972A14	4-1/2 turns; coded RED
L61	24-83601K01	18-1/2 turns; coded WHT (25 W only)
	or 24-84922C09	21-1/2 turns (10 watt only)
L62	24-83601K01	18-1/2 turns; coded WHT (2-freq. only)
L63	24-82723H03	choke; 23 uH
L101	24-83601K01	18-1/2 turns
L102	24-84972A06	8-1/2 turns; coded ORG
L103	24-84972A04	8-1/2 turns; coded WHT
L104	24-82835G13	0.82 uH
L105	24-84972A05	8-1/2 turns; coded RED
L106	24-82835G13	0.82 uH
L107	24-84972A26	3-1/2 turns; coded BLU
L108	24-84972A11	3-1/2 turns
L109	24-800484	0.31 uH
L110 (A)	24-83884G01	3-1/2 turns
L110 (M, B)	24-83884G07	2-1/2 turns; coded GRN
L110 (H, B)	24-83884G03	1-1/2 turns; coded BRN
L112	24-800484	0.31 uH
L113 (M, A)	24-83884G07	2-1/2 turns; coded GRN
L113 (H, A)	24-83884G03	1-1/2 turns; coded BRN
L113 (M, B)	24-83884G03	1-1/2 turns; coded BRN
L113 (H, B)	10-000519	wire; solid
L114	24-83601K01	18-1/2 turns (2-freq. only)
L115 (A)		NOT USED
L115 (B)	24-83961B01	3 turns; coded BRN
L250	24-83977B01	1-1/2 turns
L251 (A)	24-84346A02	choke; 230 mH
L251 (B)	24-824998	choke; 153 mH
L252 (A)	24-83884G06	4-1/2 turns; coded WHT
L252 (B)	24-83884G03	1-1/2 turns; coded BRN
L253 (A)	24-83884G04	7-1/2 turns; coded YEL

REFERENCE SYMBOL	MOTOROLA PART NO.	
L253 (B)	24-83884G09	6-1/2 t
L254 (M), 255 (M), 256 (M)	24-83884G09	6-1/2 t
L254 (H), 255 (H), 256 (H), 257	24-83884G08	5-1/2 t
		SPEAK
LS601	50-83291K01	3-1/2 i
		CONNE
P601		include 29-847 male
		TRANS
Q1	48-869940	field-e
Q2	48-869943	field-e
Q3, 4	48-869494	NPN; t
Q5	48-869571	PNP; t
Q6, 7, 8	48-869642	NPN; t
Q9	48-869494	NPN; t
Q10	48-869643	PNP; t
Q11	48-869642	NPN; t
Q100	48-869643	PNP; t
Q101, 102	48-869642	NPN; t
Q103, 104, 105	48-869494	NPN; t
Q105 (A)	48-869494	NPN; t
Q105 (B)	48-869638	NPN; t
Q106	48-869657	NPN; t
Q107	48-869859	NPN; t
Q108	48-869494	NPN; t
Q109	48-869643	PNP; t
Q110 (A)	48-869649	NPN; t
Q110 (B)	48-869641	NPN; t
Q111, 112	48-869643	PNP; t
Q113	48-869640	NPN; t
Q250 (A)	48-869860	NPN; t
Q250 (B)	48-869958	NPN; t
		RESIST unless
R1, 2	6-125A25	100 ±5%
R10	6-124C41	470
R11	6-124C57	2.2k
R12	6-124C79	18k
R13	6-124C47	820
R14	6-124C79	18k
R15	6-124C83	27k
R17	6-124C47	820
R18, 19	6-124C61	3.3k
R21	6-124C47	820
R22	6-124A17	47 ±5%
R23	6-124D06	220k
R25	6-124C59	2.7k
R26	6-124A67	5.6k ±5
R28	6-124C25	100
R29	6-124C17	47
R30	6-125D70	1 ±10%;
R31	6-124C83	27k
R34	6-124A69	6.8k ±5
R35	6-124C25	100
R36	6-124A39	390 ±5%
R37	6-124C13	33
R39	6-124C85	33k
R60	6-124C61	3.3k (2-
	or 6-124C63	3.9k (1-
R61	6-124C61	3.3k (2-
R62	6-124C39	390
R63	6-124A73	10k ±5%
R65	6-124C73	10k
R66	6-124A49	1k ±5%
R67	6-124C45	680
R68	6-124C45	680 (2-f
R69, 70	6-124C89	47k (2-f
R81	6-124B24	1.2 M ±
R82	6-124C41	470
R83	6-124A43	560 ±5%
R84	6-124A83	27k ±5%
R85	6-124A79	18k ±5%
R86	6-124A89	47k ±5%





DESCRIPTION
urns; coded BLU
urns; coded BLU
urns; coded ORG
ER:
nch; 4 ohms
CTOR, plug:
s: 15-83293K01 SHELL;
06E05 TERMINALS,
ISTOR: (SEE NOTE I)
fect; type M9940
fect; type M9943
pe M9494
pe M9571
pe M9642
pe M9494
pe M9643
pe M9642
pe M9643
pe M9642
pe M9494
pe M9494
pe M9638
pe M9657
pe M9859
pe M9494
pe M9643
pe M9649
pe M9641
pe M9643
pe M9640
pe M9860
pe M9958
OR, fixed: ±10%; 1/4 W:
otherwise stated
; 1/2 W
%
1/2 W
%
freq. only)
freq. only)
freq. only)
req. only)
req. only)
5%

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R87	6-124C77	15k
R90	6-124A78	16k ±5%
R91	6-124A92	62k ±5%
R92	6-124A43	560 ±5%
R93	6-124C57	2.2k
R94	6-124C67	5.6k ±5%
R95	6-124C89	47k
R96	6-124A11	27 ±5%
R97	6-124C51	1.2k
R101	6-124C47	820
R102	6-124A83	27k ±5%
R103	6-124A93	68k ±5%
R104	6-124A83	27k ±5%
R105	6-124A93	68k ±5%
R106	6-124A26	110 ±5%
R108	6-124A57	2.2k ±5%
R109, 110	6-124A67	5.6k ±5%
R111	6-124A69	6.8k ±5%
R112	6-124A73	10k ±5%
R113	6-124A71	8.2k ±5%
R114	6-124C59	2.7k ±10%
R115	18-84944C02	var; 25k ±5%
R116	6-124C67	5.6k ±10%
R117	6-124B02	150k ±5%
R118	6-124B04	180k ±5%
R119	6-124A65	4.7k ±5%
R120	6-124A75	12k ±5%
R121	6-124A49	1k ±5%
R122	6-124A67	5.6k ±5%
R123	6-124A73	10k ±5%
R124	6-124A19	56 ±5%
R125	6-124C37	330 ±10%
R126	6-124C33	220 ±10%
R127 (A)	6-124C33	220 ±10%
R127 (B)	6-124A29	150 ±5%
R128	6-124A27	120 ±5%
R129	6-124C63	3.9k ±10%
R130	6-124C25	100 ±10%
R131	18-84944C02	var; 25k
R132	6-124C67	5.6k ±10%; (2-freq. only)
R133	6-124B02	150k; (2-freq. only)
R134	6-124B04	180k; (2-freq. only)
R135	6-124A65	4.7k; (2-freq. only)
R136	6-124C75	12k ±10%; (2-freq. only)
R137	6-124A49	1k; (2-freq. only)
R138 (A)	6-124C17	47
R138 (B)	6-124C01	10
R139	6-124D61	4.7
R140	18-84944C04	variable; 500
R141	6-124C35	270
R142	6-125C29	150; 1/2 W
R143	6-125C47	820; 1/2 W
R144	6-124A53	1.5k ±5%
R145 (A)	17-82036G48	0.1 ±5%; 2 W
R145 (B)	17-82036G49	0.05 ±5%; 2 W
R146	6-124A59	2.7k ±5%
R147	6-124C49	1k
R148, 149	6-124A69	6.8k ±5%
R150	6-124C49	1k
R151	6-124A26	110 ±5%
R152	6-124C01	10
R153	6-125A25	100 ±5%; 1/2 W
R154	6-124A85	33k ±5%
R155	6-125C53	1.5k
R156	6-125A25	100 ±5%; 1/2 W
R157 (M, B)	6-124C41	470
R157 (H, B)	6-124C45	680
R158 (A)		NOT USED
R158 (B)	6-124C45	680
R250 (A)	6-124C25	100
R250 (B)		NOT USED
R251	6-125C47	820; 1/2 W
R252	6-124C63	3.9k
R253	6-124D55	2.7
R254 (A)	6-125C07	18; 1/2 W
R254 (B)	6-124C17	47
R255	6-124C17	47
R601	18-83288K01	var; 100k; 30% @ 1/2 rotation
R602	18-83287K01	var; 100k
R603	17-82036G13	fixed: 0.75; 2 W
		THERMISTOR:
RT101	6-83600K01	1k @ 25°C

REFERENCE SYMBOL
S601
S603
U1
U2
VR1
VR2
VR101
XF601
Y1, 2
Y3
Y4
Y5
Y101, 102
NON-
NON
NON-REFI
OT

NOTES:
I. For optim
integrated
numbers.
II. When ord
specify fa
and rotat

MOTOROLA PART NO.	DESCRIPTION
	SWITCH ASSEMBLY: P/O R601
40-8329K02	1 dpdt (2-freq. only)
	INTEGRATED CIRCUIT: (SEE NOTE I)
51-84320A78	type M2078
51-84320A77	type M2077
	VOLTAGE REGULATOR:
48-82256C56	Zener type, 8.8 V
48-82256C50	Zener type, 13 V
48-82256C56	Zener type, 8.8 V
	FUSEHOLDER:
14-82882A01	BODY, fuseholder
14-82883A01	CAP, fuseholder
29-84706E05	PIN, male; 4 req'd.
41-82885A01	SPRING, fuseholder
42-82884A01	CLIP, fuse; 2 req'd.
	CRYSTAL: (SEE NOTE II)
XXN6122AA	46.700-54.433 MHz (1 & 2-freq.)
48-84396K03	IF; 10.7 MHz
48-84396K04	IF; 10.7 MHz
48-84396K03	IF; 10.7 MHz
XXN6121AA	16.7555-19.3333 MHz
REFERENCED ITEMS (RECEIVER)	
9-83487K01	SOCKET, crystal (used on Y1 and Y2)
14-84602K01	INSULATOR, crystal (used on Y3, Y4, and Y5)
26-83264F01	SHIELD, coil
26-84598A01	SHIELD, coil; large hole (for RF & OSC coil)
26-84598A02	SHIELD, coil; small hole (for IF coil)
26-82570L01	HEATSINK: 1.20 x .90" (used with U2)
26-82571L01	HEATSINK: .59 x .32" (used with U2)
-REFERENCED ITEMS (EXCITER)	
9-83487K01	SOCKET, for Y101, Y102
26-84598A01	SHIELD, coil
76-83960B01	FERRITE BEAD
ERENCED ITEMS (POWER AMPLIFIER)	
26-84716D01	HEATSINK
26-83578L01	HEATSINK (20 W models only)
HER NON-REFERENCED ITEMS	
9-83396K02	SOCKET, lamp; for DS601
9-83396K03	SOCKET, lamp; for DS602
38-83138K02	BUTTON, push; ORG
5-83128K03	HOUSING
13-84126L01	NAME PLATE
13-84253L02	NAME PLATE, FCC
16-83132K02	KNOB, control

um performance, diodes, transistors, and circuits must be ordered by Motorola part

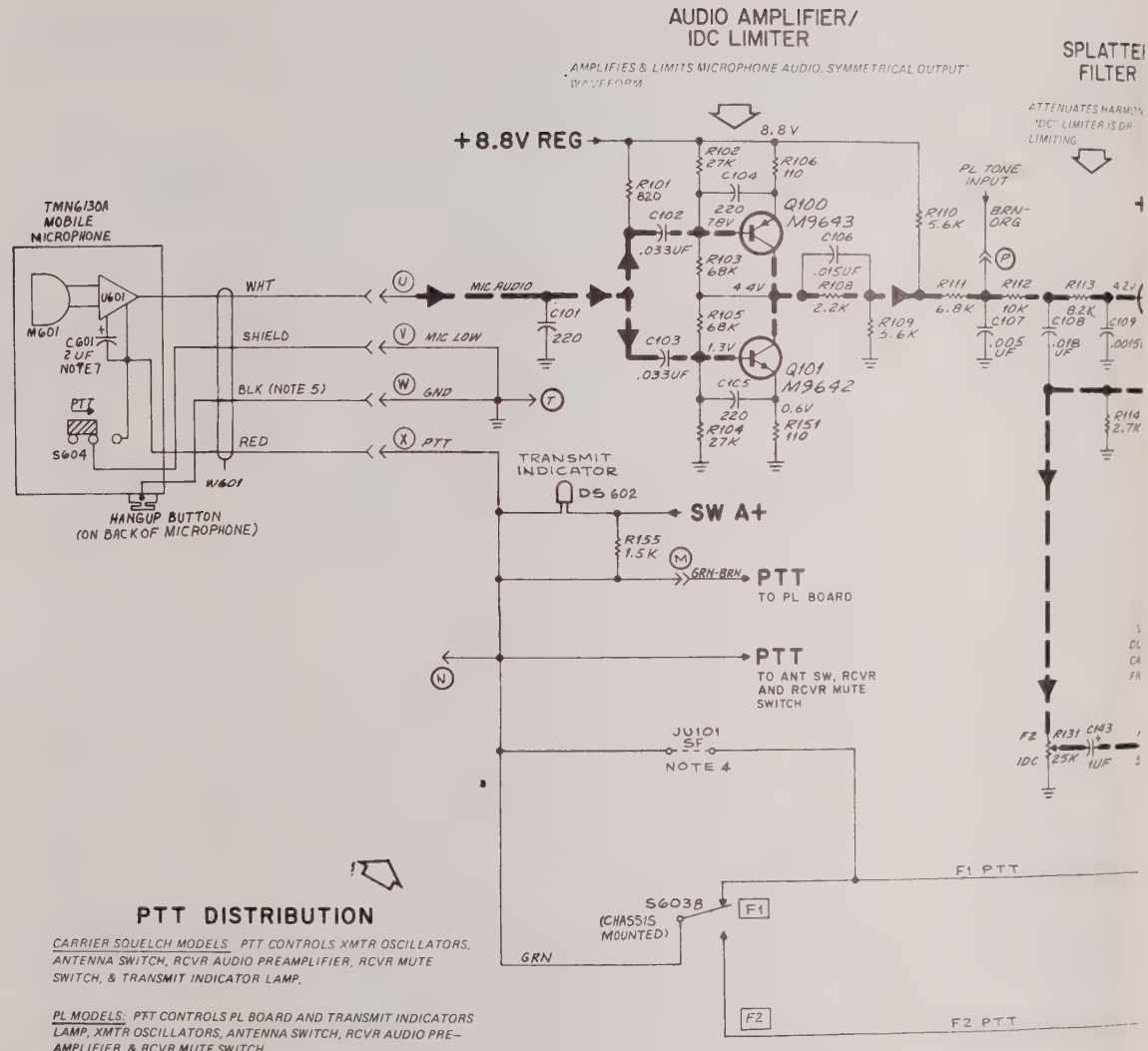
ring quartz crystal units or ceramic resonators, rrier frequency, crystal (or resonator) frequency l (or resonator) type number.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

PARTS LIST

TMN6130A Microphone PL-5333-O

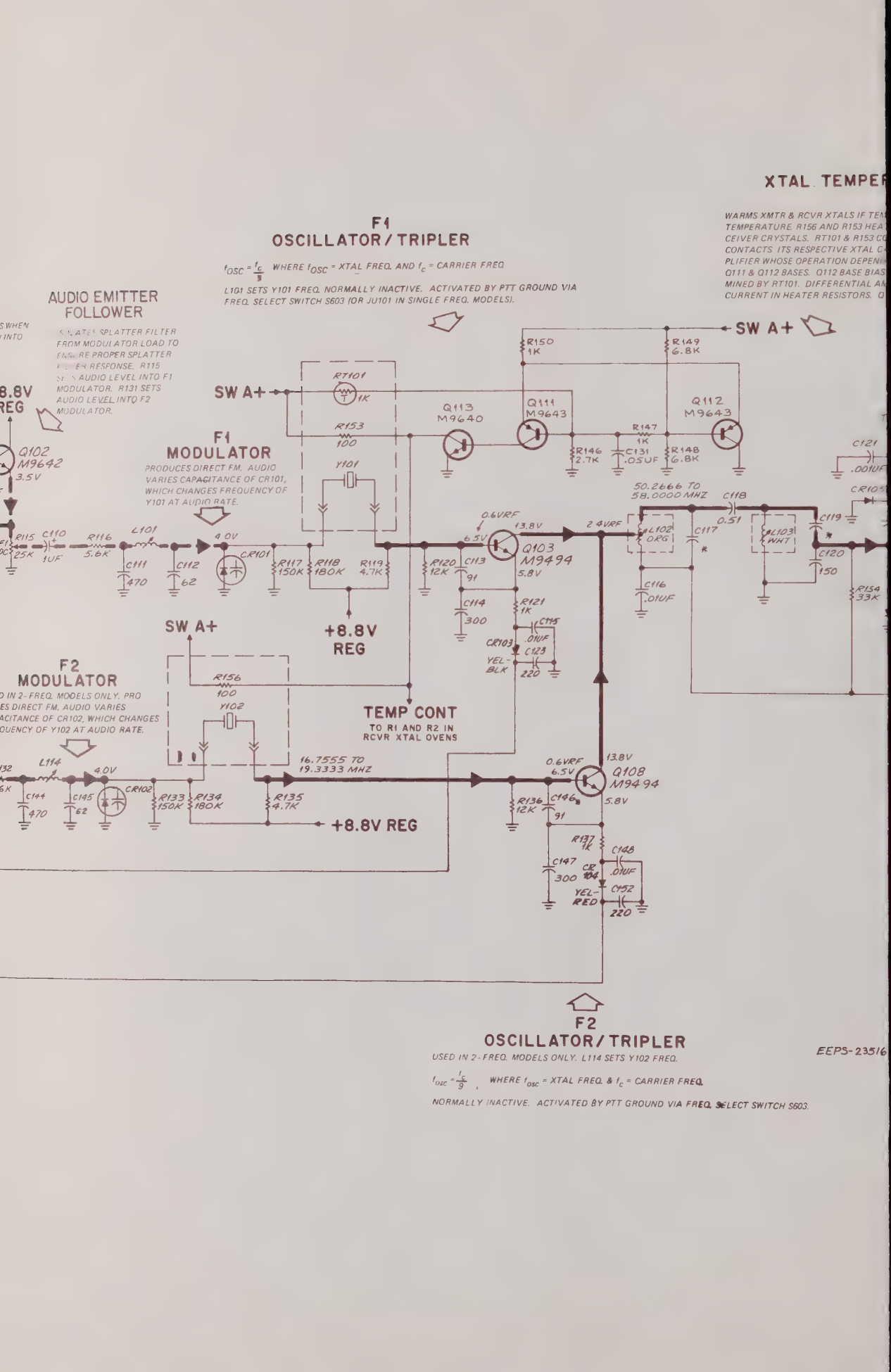
C601	23-84669A27	CAPACITOR, fixed: 2 uF
S604	40-84622B07	SWITCH, slide: dpdt
U601	51-84333G79	HYBRID CIRCUIT: hybrid preamplifier
W601	30-83586L01	CORD, microphone; coiled: 4 conductor; includes 39-10184A24 TERMINAL PIN (4 req'd.) female 29-83277G02 LUG (4 req'd.) 41-83576L01 SPRING, strain relief
NON-REFERENCED ITEMS		
	50-83905L01	DYNAMIC CARTRIDGE
	33-83577L01	NAMEPLATE
	33-83574L01	PUSHBUTTON
	3-139797	SCREWS, tapping; #5-20 x 5/8"; 3 req'd.
	4-001725	WASHER, flat
	4-82707B01	WASHER, flat
	5-855939	RIVET, shoulder
	15-83572L01	HOUSING, back
	15-83573L01	HOUSING, front
	29-005247	LUG
	35-83575L01	GRILL CLOTH

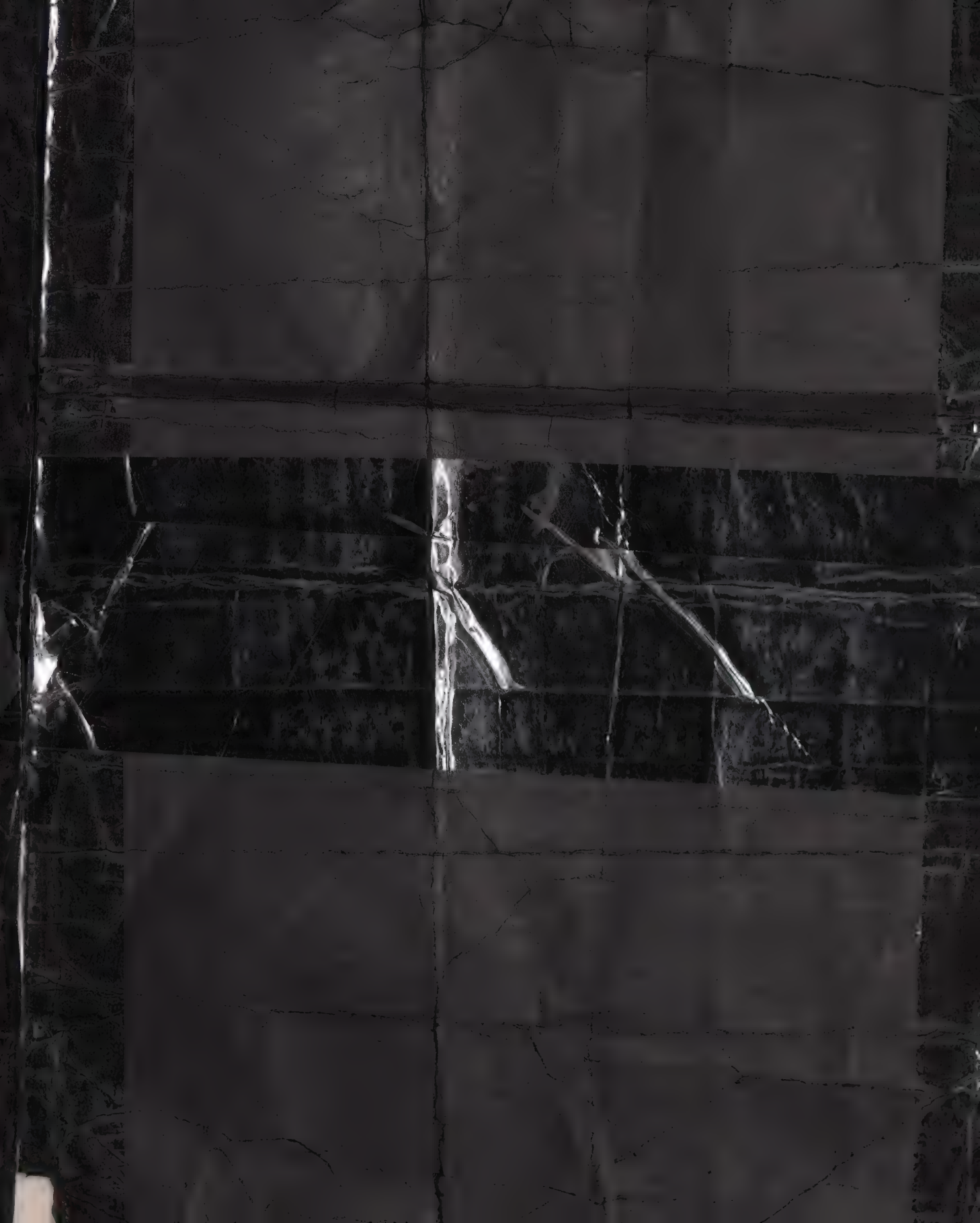


PTT DISTRIBUTION

CARRIER SQUELCH MODELS PTT CONTROLS XMTR OSCILLATORS, ANTENNA SWITCH, RCVR AUDIO PREAMPLIFIER, RCVR MUTE SWITCH, & TRANSMIT INDICATOR LAMP.

PL MODELS: PTT CONTROLS PL BOARD AND TRANSMIT INDICATORS LAMP, XMTR OSCILLATORS, ANTENNA SWITCH, RCVR AUDIO PRE-AMPLIFIER, & RCVR MUTE SWITCH.


F1
OSCILLATOR / TRIPLER
$f_{OSC} = \frac{f_c}{9}$ WHERE f_{OSC} = XTAL FREQ. AND f_c = CARRIER FREQ
L101 SETS Y101 FREQ. NORMALLY INACTIVE. ACTIVATED BY PTT GROUND VIA FREQ. SELECT SWITCH S603 (OR JU101 IN SINGLE FREQ. MODELS).
AUDIO EMITTER FOLLOWER
SW A+
R150 1K
R149 6.8K
RT101 1K
R153 100
Y101
Q113 M9640
Q111 M9643
Q112 M9643
R147 1K
R146 2.7K
C131 .05UF
R148 6.8K
F1 MODULATOR
PRODUCES DIRECT FM. AUDIO VARIES CAPACITANCE OF CR101, WHICH CHANGES FREQUENCY OF Y101 AT AUDIO RATE.
Q102 M9642
3.5V
R115 25K
C110 1UF
R116 5.6K
L101
C111 470
C112 62
4.0V
CR101
R117 150K
R118 180K
R119 4.7K
+8.8V REG
0.6VRF
13.8V
6.5V
Q103 M9494
5.8V
R120 12K
C113 91
C114 300
R121 1K
C115 .01UF
CR103
C123
YEL-BLK
220
2.4VRF
50.2666 TO 58.0000 MHZ
C118 0.5T
L102 ORG
C117
L103 WHT
C119
C120 150
C116 .01UF
C121 .001UF
R154 33K
SW A+
F2 MODULATOR
R156 100
Y102
TEMP CONT
TO R1 AND R2 IN RCVR XTAL OVENS
16.7555 TO 19.3333 MHZ
L114
4.0V
C144 470
C145 62
CR102
R133 150K
R134 180K
R135 4.7K
+8.8V REG
0.6VRF
6.5V
13.8V
Q108 M9494
5.8V
R136 12K
C146 91
R137 1K
C147 300
CR 104
C148 .01UF
YEL-RED
C152 220
F2
OSCILLATOR / TRIPLER
USED IN 2-FREQ. MODELS ONLY. L114 SETS Y102 FREQ.
$f_{osc} = \frac{f_c}{9}$, WHERE f_{osc} = XTAL FREQ. & f_c = CARRIER FREQ.
NORMALLY INACTIVE. ACTIVATED BY PTT GROUND VIA FREQ. SELECT SWITCH S603.
EEPS-23516



RATURE REGULATOR

PERATURE IS BELOW −10°C. RT101 SENSES XTAL
T TRANSMITTER XTALS. R1 AND R2 HEAT RE−
NTACT Y101 CASE & EACH HEATER RESISTOR
SE. Q111 & Q112 FORM A DIFFERENTIAL AM−
S ON THE VOLTAGE DIFFERENCE BETWEEN
IS REFERENCE & Q111 BASE BIAS IS DETER−
PLIFIER CONTROLS Q113, WHICH CONTROLS
13 IS OFF AT TEMPERATURES ABOVE −10°C.

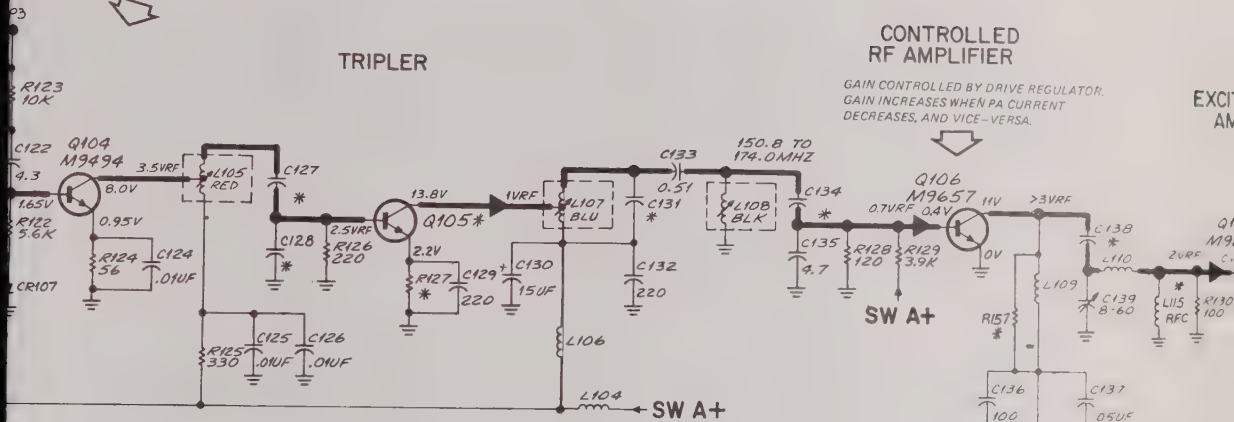
BUFFER

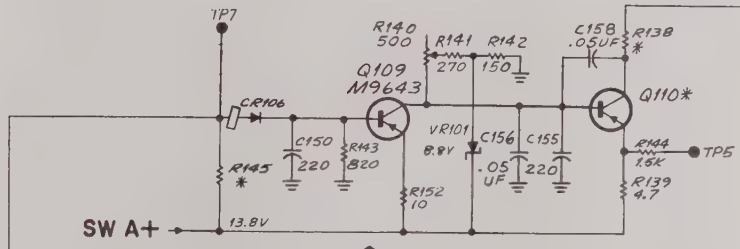
PROVIDES RESERVE GAIN TO ISOLATE OSCILLATOR FROM FOLLOWING STAGE.

TRIPLER

CONTROLLED RF AMPLIFIER

GAIN CONTROLLED BY DRIVE REGULATOR. GAIN INCREASES WHEN PA CURRENT DECREASES, AND VICE−VERSA.



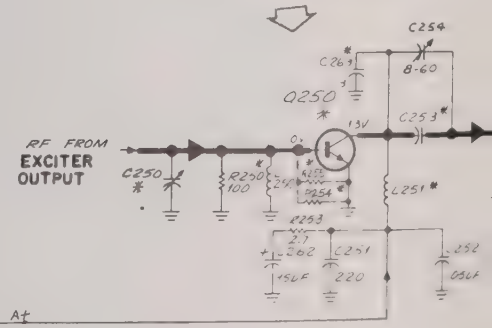


SENSES PA CURRENT TO CONTROL XMTR PA DRIVE LEVEL. VOLTAGE DROP ACROSS R145 PROVIDES PA CURRENT SENSING. Q110 IS IN SERIES WITH CONTROLLED RF AMPLIFIER Q106 A+ LINE. Q110 OPERATING POINT THEREFORE CONTROLS GAIN OF Q106. POWER SET CONTROL R140 SETS NORMAL OPERATING POINT OF Q110. INCREASED PA CURRENT CAUSES DECREASED Q110 CONDUCTION WHICH DECREASES XMTR DRIVE, AND VICE−VERSA.

DRIVE REGULATOR

RF POWER AMPLIFIER

CLASS C AMPLIFIER. COMPONENTS SHOWN ARE MOUNTED ON MAIN CIRCUIT BOARD.



REG PA A+

NOTES

1. COMPONENTS MARKED WITH AN ASTERISK MAY HAVE DIFFERENT VALUES (OR TYPE NUMBERS) ON DIFFERENT RADIO MODELS, OR MAY BE OMITTED ON SOME MODELS. SEE UNIFIED CHASSIS PARTS LIST

   THE FOLLOWING PARTS ARE OMITTED ON 10 WATT MODELS: L115, R157, R156, R255

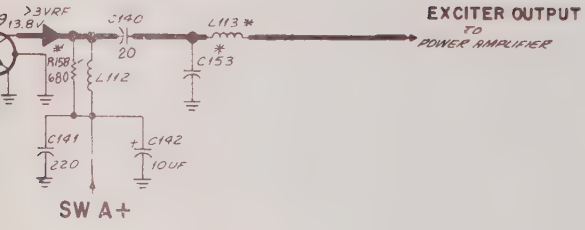
   THE FOLLOWING PARTS ARE OMITTED ON 20 WATT MODELS: C153, C263, R250.

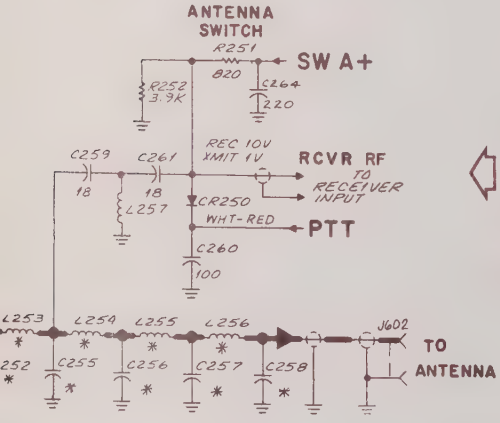
2. UNLESS OTHERWISE NOTED, RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES ARE IN PICOFARADS.
3. UNLESS OTHERWISE NOTED, DC VOLTAGES ARE MEASURED WITH A 20,000 OHM–PER–VOLTMETER, AND RF VOLTAGES ARE MEASURED WITH AN RF VOLTMETER
4. JUMPER CONNECTIONS ARE SHOWN IN THE FOLLOWING TABLE.

JUMPER NUMBER	IN	OUT
JU1	SINGLE–FREQUENCY RECEIVER MODELS	TWO
JU2	CARRIER SQUELCH AND DIGITAL "PRIVATE–LINE" MODELS	TONE
JU3	SINGLE–FREQUENCY RECEIVER MODELS	TWO
JU101	SINGLE–FREQUENCY TRANSMITTER MODELS	TWO MODE
JU601	ALL MODELS	OPTIO

5. IN CARRIER SQUELCH MODELS, THE BLACK MICROPHONE WIRE IS CONNECTED TO PUSH–PIN W IN PL AND DPL MODELS, THE BLACK WIRE IS CONNECTED TO THE ORG–RED WIRE ON THE PL OR DPL BOARD. USING AN IN–LINE CONNECTOR SEE PL OR DPL SCHEMATIC DIAGRAM FOR APPROPRIATE CONNECTION DETAILS.
6. CONNECTIONS ARE SHOWN FOR MODEL TMN6130A MOBILE MICROPHONE. FOR DESK MICROPHONE CONNECTIONS, SEE SECTION 68P81030E06. CONNECTION INFORMATION FOR THE OPTIONAL HANDSET WITH HANGUP BOX IS PROVIDED WITH THE HANDSET OPTION.
7. CAPACITOR C601 IN THE MOBILE MICROPHONE IS PHYSICALLY MOUNTED ON UNUSED CONTACTS OF PTT SWITCH

R OUTPUT
IFIER





ATTENUATES FREQUENCIES ABOVE 162 MHz (MEDIUM RANGE) OR 174 MHz (HIGH RANGE)

HARMONIC FILTER

ANTENNA SWITCH ISOLATES RCVR INPUT DURING TRANSMISSION. NETWORK C259–L257– C261= 1/4 WAVE TRANSMISSION LINE. CR250 AT OUTPUT END.

RECEIVE: PTT UNGROUNDED. CR250 NONCONDUCTING (OPEN CIRCUIT). 1/4 WAVE L
PA OUTPUT CIRCUIT IS HIGH IMPEDANCE TO RECEIVED RF. RF PASSES TO RCVR RF IN

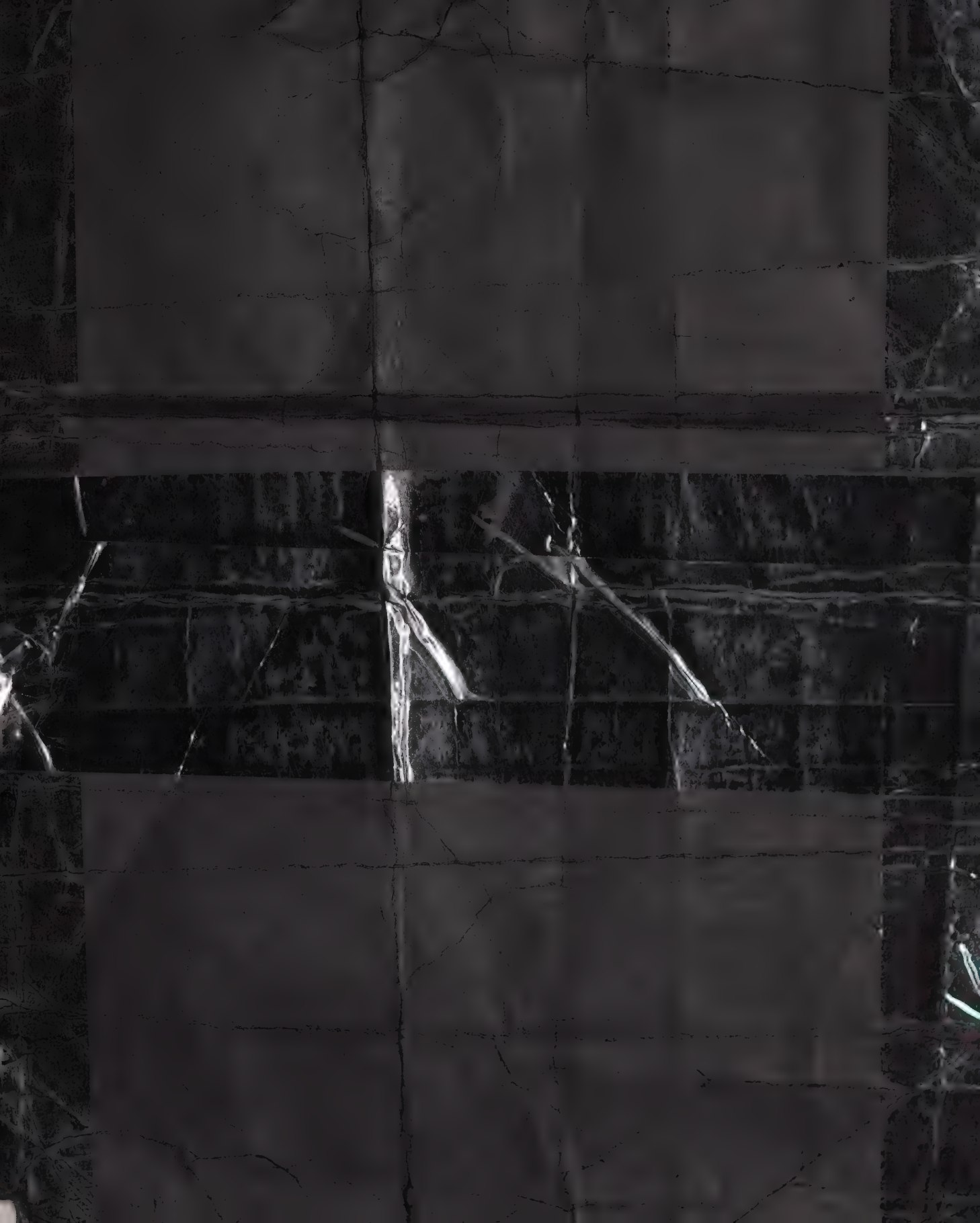
TRANSMIT: PTT GROUNDED. CR250 CONDUCTS (SHORT CIRCUIT). SHORT AT 1/4 WAVE LINE OUTPUT CAUSES "OPEN" AT LINE INPUT. XMTR RF IS BLOCKED FROM RCVR RF INPUT.

LEGEND

= THEORY OF

= PRIMARY RF

= PRIMARY AU



UNIFIED CHASSIS EXCITER SECTION

REQUENCY RECEIVER MODELS
CODED "PRIVATE–LINE" MODELS
REQUENCY RECEIVER MODELS
REQUENCY TRANSMITTER
S
NAL (DISABLES PWR ON LAMP)

NE INPUT Z = 50 OHMS.
PUT.

PERATION DATA
SIGNAL FLOW
DIO SIGNAL FLOW

FUNCTION

Amplifies voice signals from the microphone and produces a low-level FM modulated rf signal for the rf power amplifier.

68P81034E51-O
(Sheet 4 of 4)
3/31/77-NPC

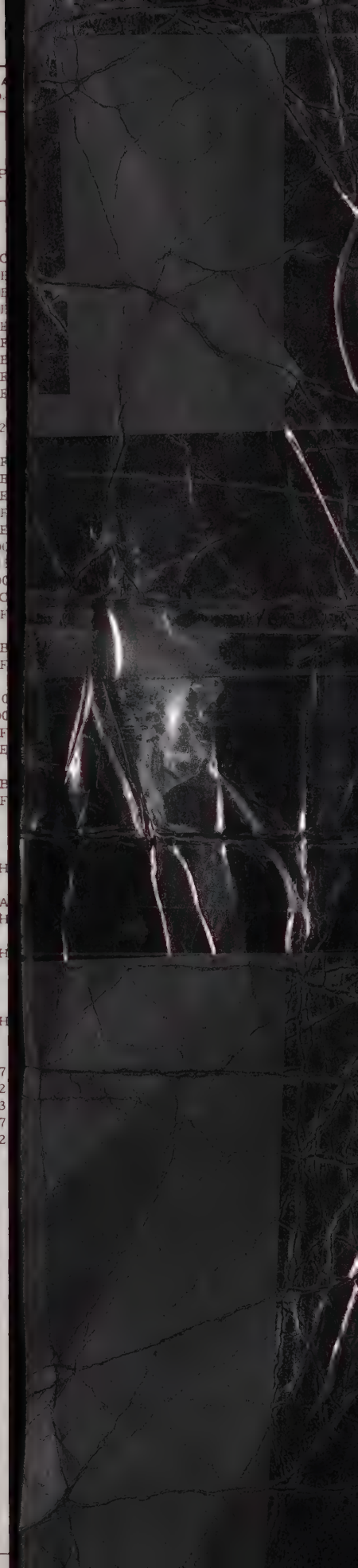
TONE "PRIVATE-LINE" ENCODER/DECODER

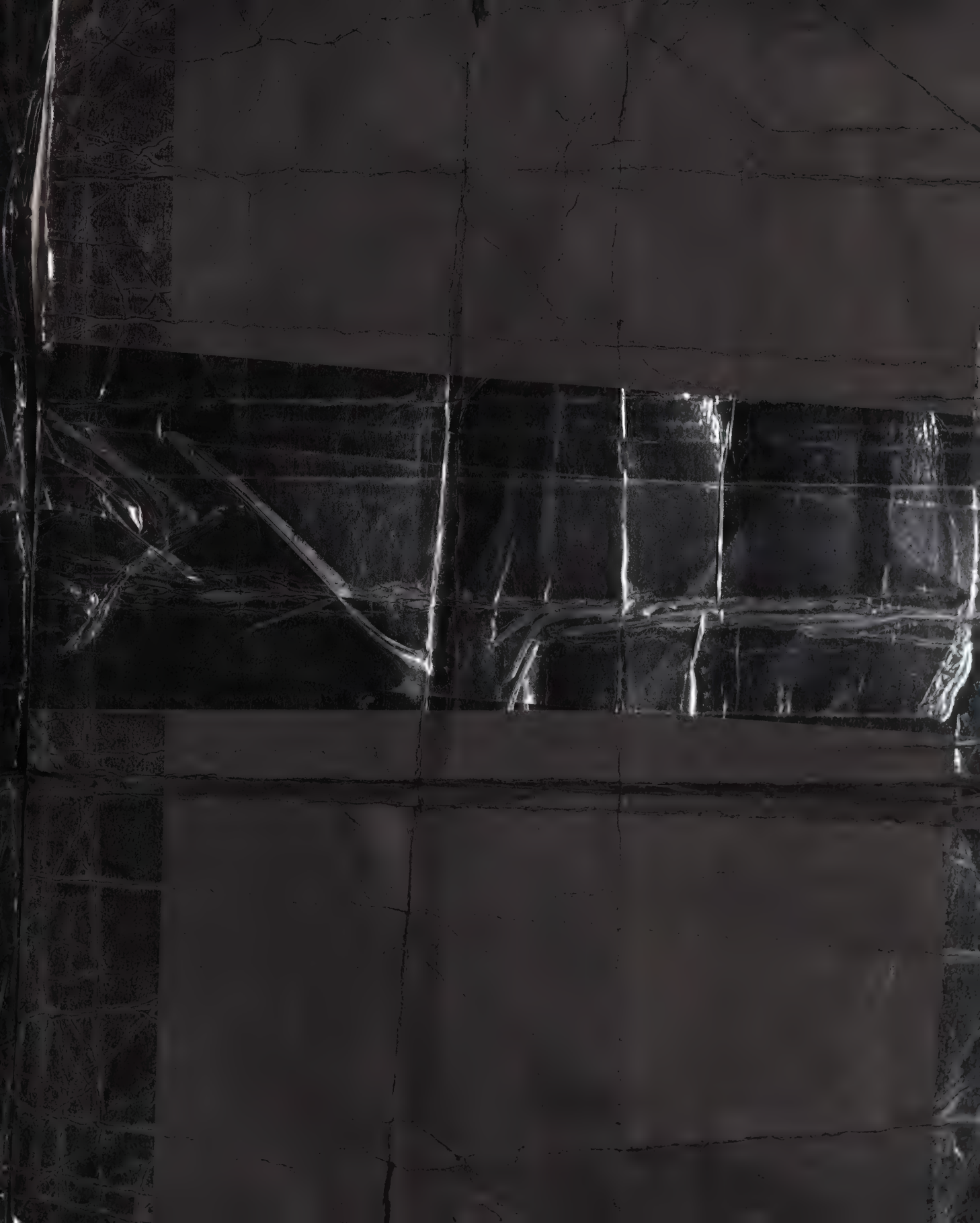
MODEL TRN6904A

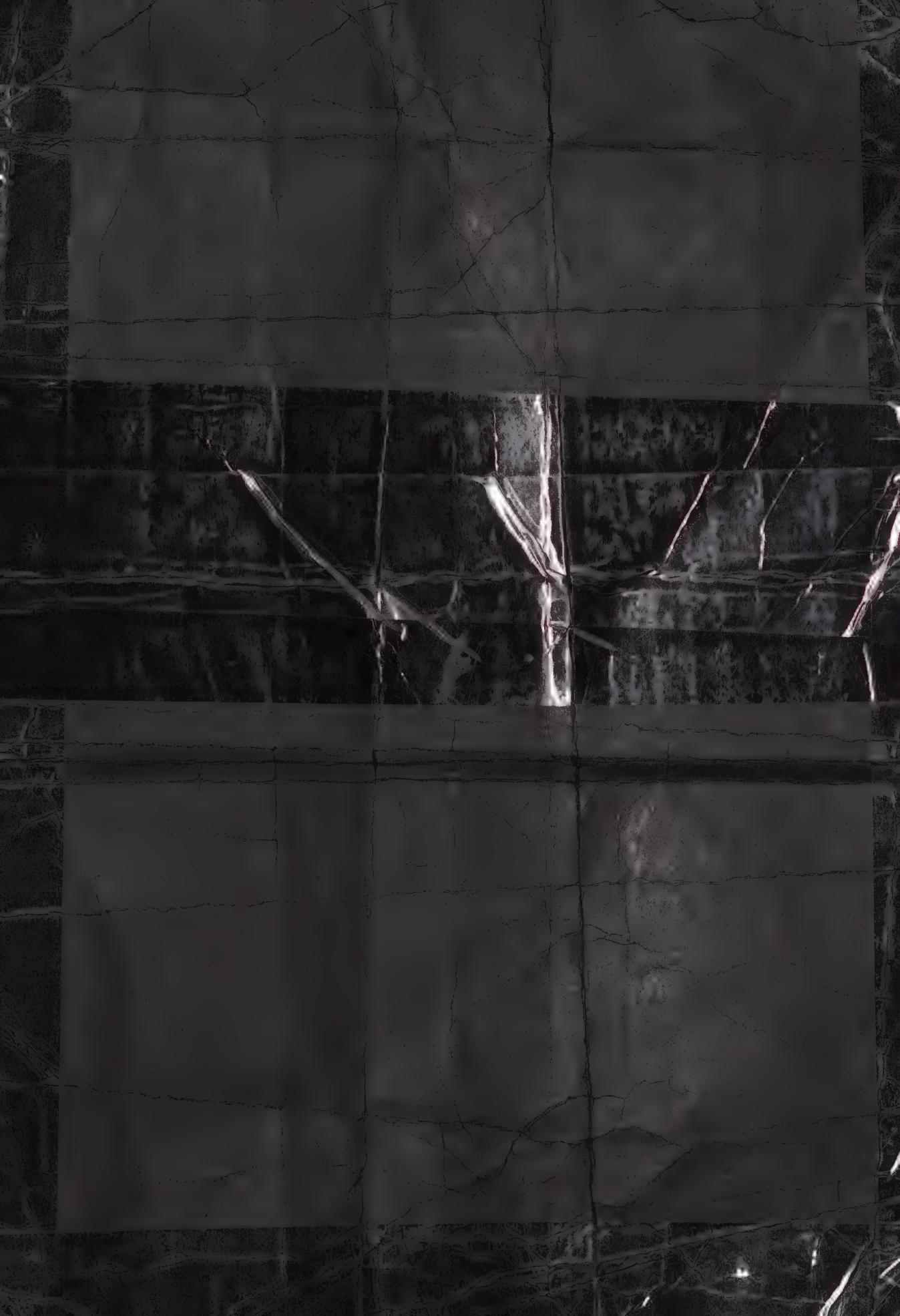
PARTS LIST

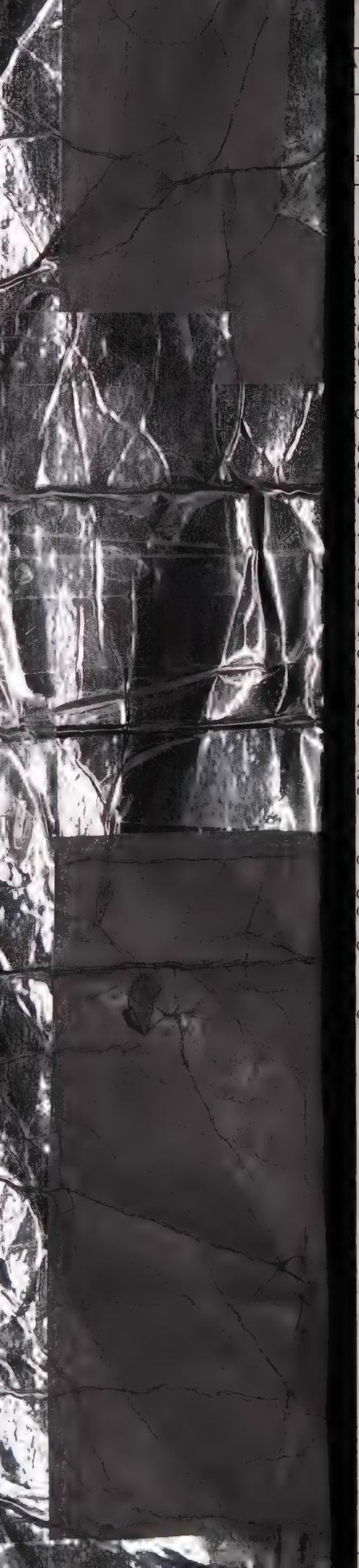
TRN6904A Tone-Coded "P
Encoder/Decoder

REFERENCE SYMBOL	MOTOROLA PART NO.
C401	21-82372C
C402, 403	21-82428E
C404	21-82428E
C405	21-82428E
C406	21-83596E
C407, 408	23-84665F
C409	21-82428E
C410	23-84665F
C411	21-83596E
C412, 413, 414	
C415	8-82096J2
C416	
C417	23-84665F
C418, 419	21-82428E
C420	21-83596E
C421	23-84665F
C422	21-83596E
C423, 424	8-84496D0
C425	8-82905G
C426	8-84496D0
C427	21-82372C
C428	23-84665F
C429	
C430	21-82428E
C431	23-84665F
C432, 433	
C434	8-83813H0
C435	8-84496D0
C436	23-84665F
C437	21-83596E
C438	
C439	21-82428E
C440	23-84665F
CR401	
CR402	48-83654H
CR403	
CR404	48-82178A
CR405	48-83654H
CR406	
CR407, 408, 409	48-83654H
L401	25-82498H
Q401, 402	48-134667
Q403 thru 406	48-869642
Q407	48-869643
Q408	48-134667
Q409	48-869642
R401, 402	6-124D02
R403, 404, 405	6-124A99
R406	6-124D02
R407	6-124A99
R408	6-124C49
R409	6-124C69
R410	6-124C63
R411	6-124A99
R412	6-124C85
R413	6-124C55
R414	6-124C37
R415	
R416	6-124C65
R417 thru 420	
R421	6-124C87
R422 thru 427	
R428	6-124C49
R429	6-124C83
R430	6-124C33
R431	6-124C61
R432	6-124C57





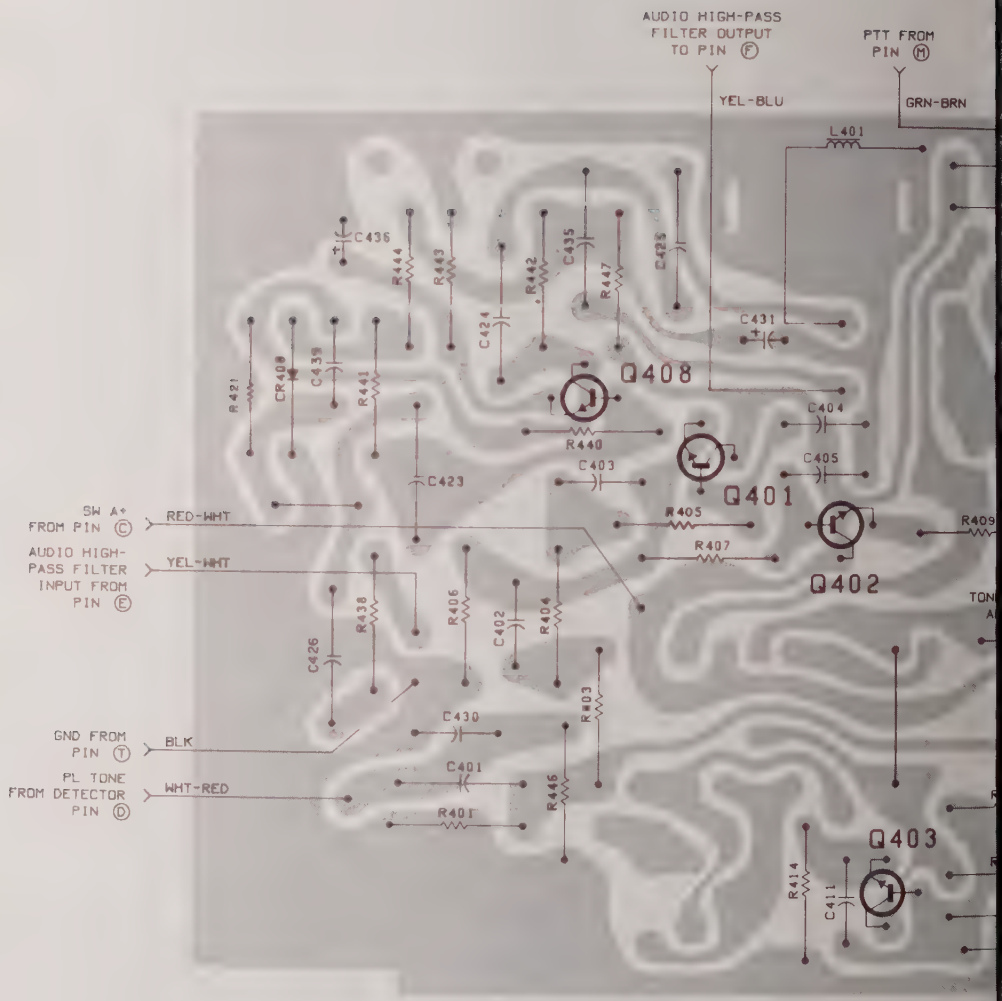




	DESCRIPTION
	rivate-Line"
	PL-5334-O
	CAPACITOR, fixed: uF ±10%;
	100 V; unless otherwise stated
01	0.1 +80-20%; 25 V
59	.01 +80-20%; 200 V
23	.0012
59	.01 +80-20%; 200 V
10	220 pF ±20%; 500 V
01	10 +100-0%; 25 V
09	.0047
01	10 +100-0%; 25 V
10	220 pF ±20%; 500 V
	NOT USED
0	0.22
	NOT USED
04	1 +150-0%; 50 V
09	.0047
10	220 pF ±20%; 500 V
01	10 +100-0%; 25 V
10	220 pF ±20%; 500 V
4	.047 ±20%; 100 V
1	0.15; 50 V
4	.047 ±20%; 100 V
01	0.1 +80-20%; 25 V
01	10 +100-0%; 25 V
	NOT USED
59	.01 +80-20%; 200 V
04	1 +150-0%; 50 V
	NOT USED
1	.0068
4	.047 ±20%; 100 V
01	10 +100-0%; 25 V
10	220 pF ±20%; 500 V
	NOT USED
28	.002
04	1 +150-0%; 50 V
	DIODE: (SEE NOTE)
	NOT USED
01	silicon
	NOT USED
06	germanium
01	silicon
	NOT USED
01	silicon
	COIL:
02	6 H
	TRANSISTOR: (SEE NOTE)
	NPN; type M54
	NPN; type M9642
	PNP; type M9643
	NPN; type M54
	NPN; type M9642
	RESISTOR, fixed: ±10%; 1/4 W;
	unless otherwise stated
	150k
	120k ±5%
	150k
	120k ±5%
	1k
	6.8k
	3.9k
	120k ±5%
	33k
	1.8k
	330
	NOT USED
	4.7k
	NOT USED
	22k
	NOT USED
	1k
	27k
	220
	3.3k
	2.2k

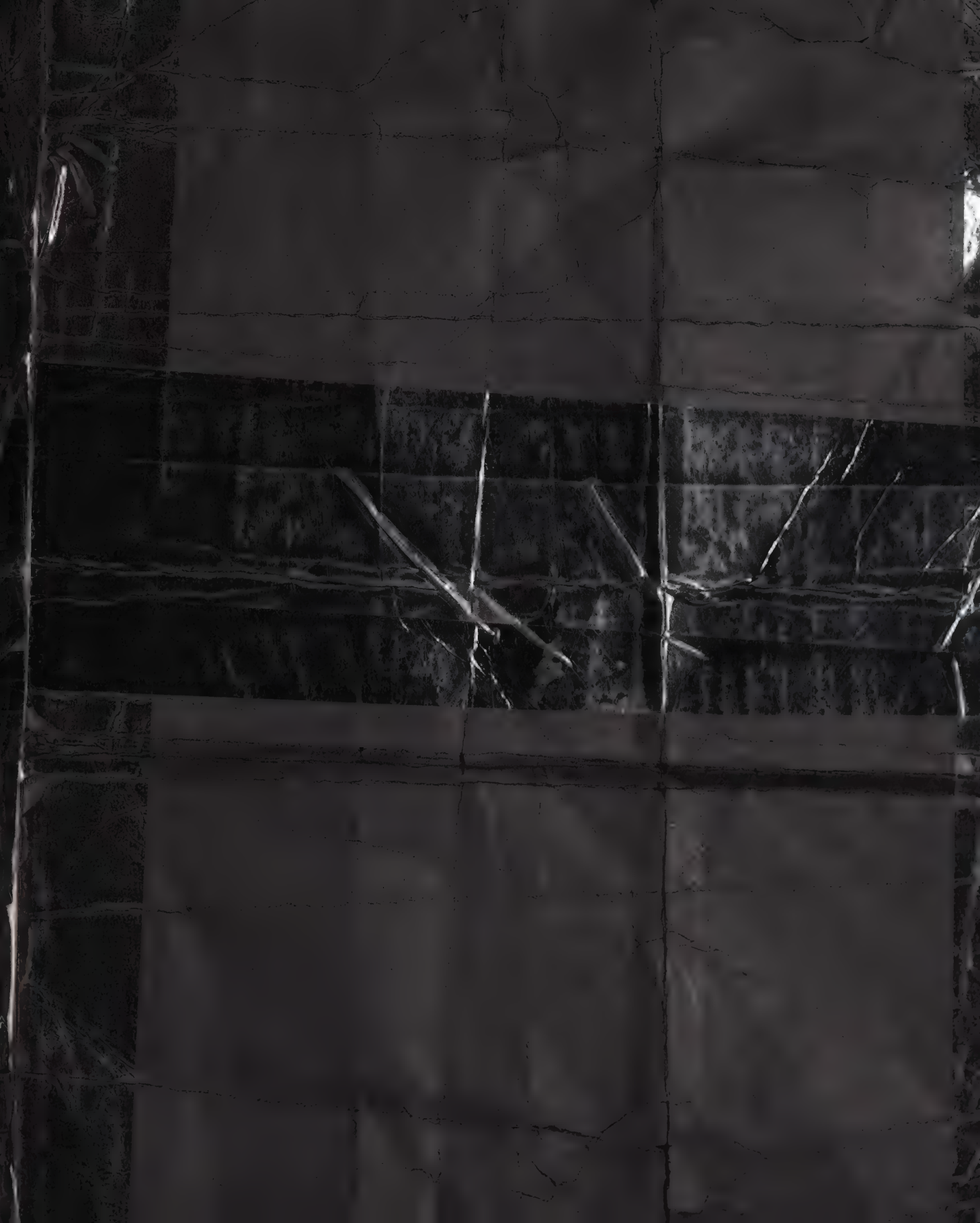
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R433	18-84944C02	variable: 25k
R434	6-124C53	1.5k
R435	6-124C87	22k
R436	6-124C45	680
R437	6-124C97	100k
R438	6-124C73	10k
R439		NOT USED
R440	6-124D02	150k
R441	6-124C89	47k
R442	6-124C97	100k
R443, 444	6-124C73	10k
R445	6-124C77	15k
R446	6-124C85	33k
R447	6-124C49	1k
R448	6-124C97	100k
R449		NOT USED
		THERMISTOR:
RT401	6-82990E18	190 ohms
		INTEGRATED CIRCUIT: (SEE NOTE)
U401	51-84267A04	type 67A04
		DIODE: (SEE NOTE)
VR401	48-82256C25	Zener type; 12 V
	NON-REFERENCED ITEMS	
	TLN6709B	"VIBRASPONDER", resonant reed
	42-84116B02	SOCKET, "Vibrasponder"
	39-10184A10	CONTACT, push-pin; male
	39-10184A24	CONTACT, push-pin; female
	29-84706E06	PIN, female; molex

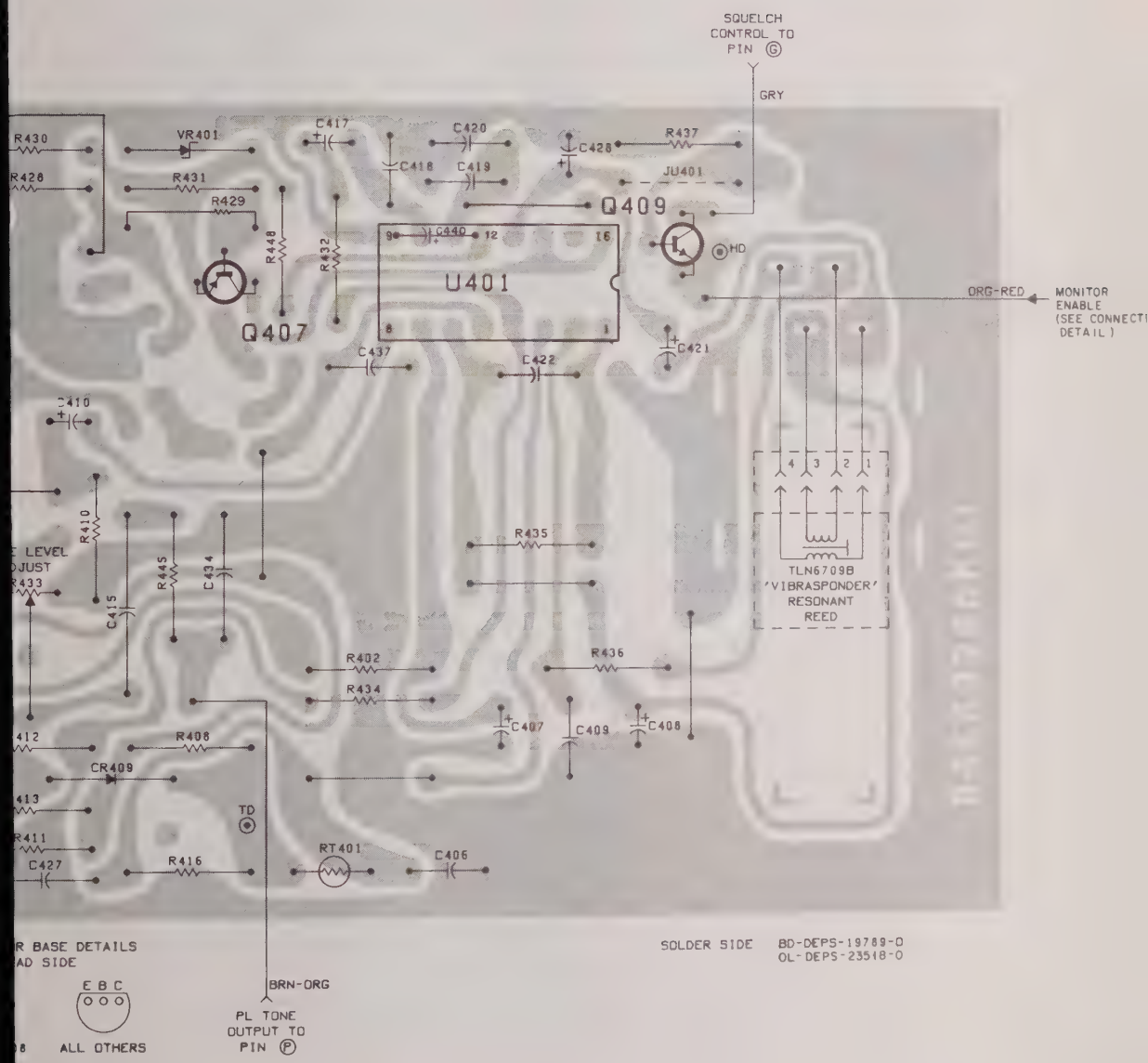
NOTE: For optimum performance, replacement diodes, transistors, and integrated circuits must be ordered by Motorola part number.



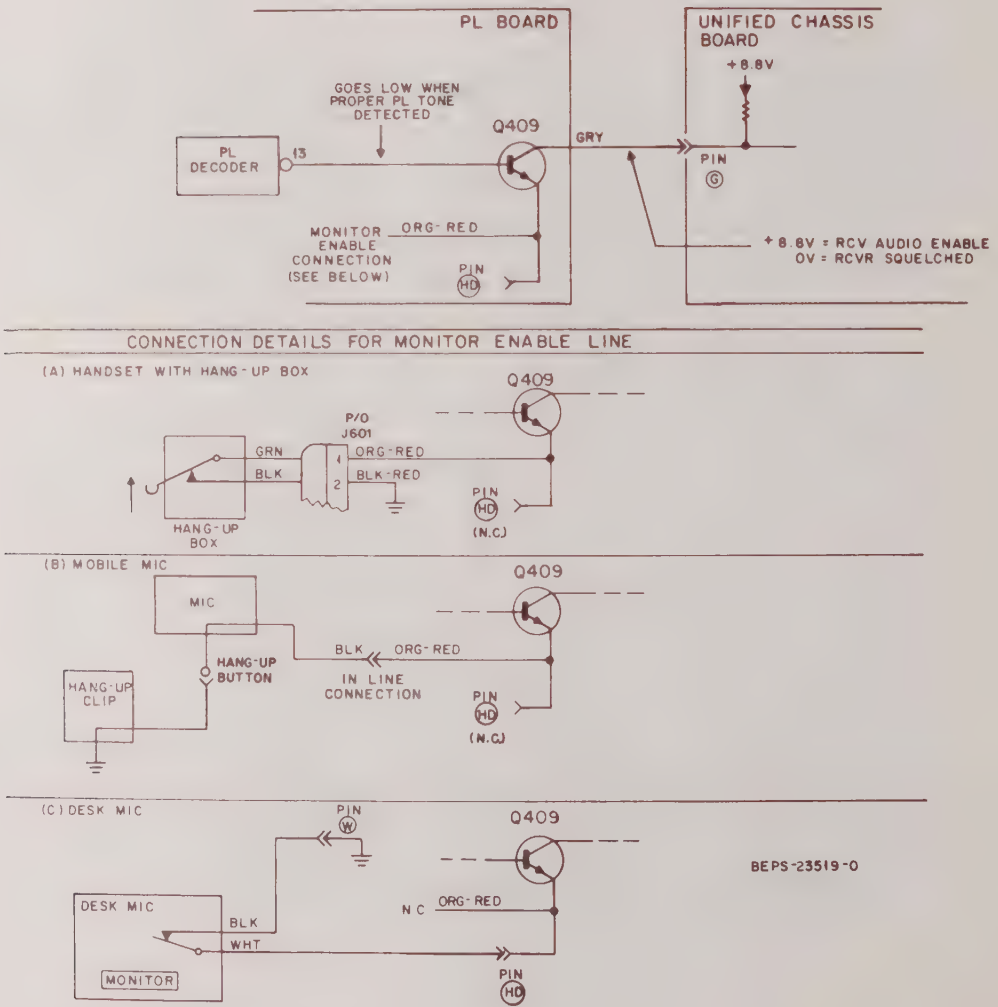
SHOWN FROM SOLDER SIDE

TRANSISTO
LE
C
E
B
Q401, 402, 4

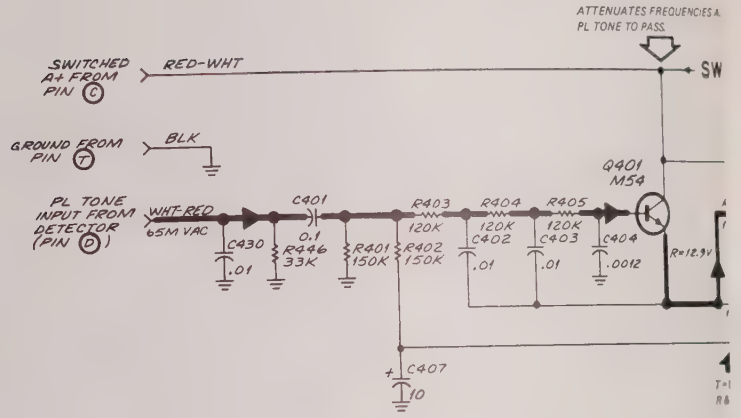


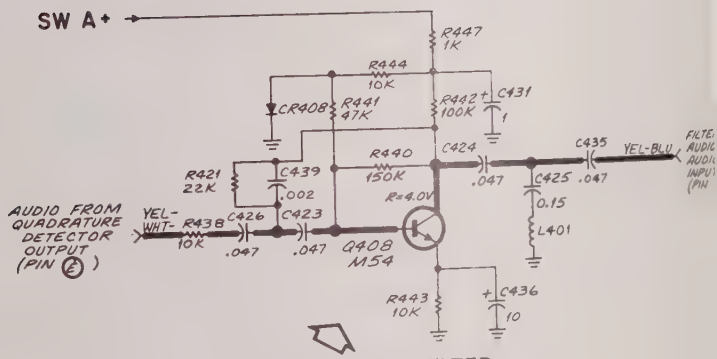

SQUELCH CONTROL TO PIN G
GRY
R430
R428
VR401
R431
R429
C417
C418
C420
C419
C428
R437
JU401
Q409
HD
R448
R432
C440
U401
Q407
ORG-RED
MONITOR ENABLE (SEE CONNECTI DETAIL)
C437
C422
C421
C410
R410
R435
R445
C434
C415
TLN6709B 'VIBRASPONDER' RESONANT REED
R402
R434
R436
C407
C409
C408
R408
CR409
TD
R411
C427
R416
RT401
C406
R BASE DETAILS
AD SIDE
E B C
ALL OTHERS
BRN-ORG
PL TONE OUTPUT TO PIN P
SOLDER SIDE
BD-DEPS-19789-0
OL-DEPS-23518-0

MONITOR ENABLE CONNECTION DETAIL



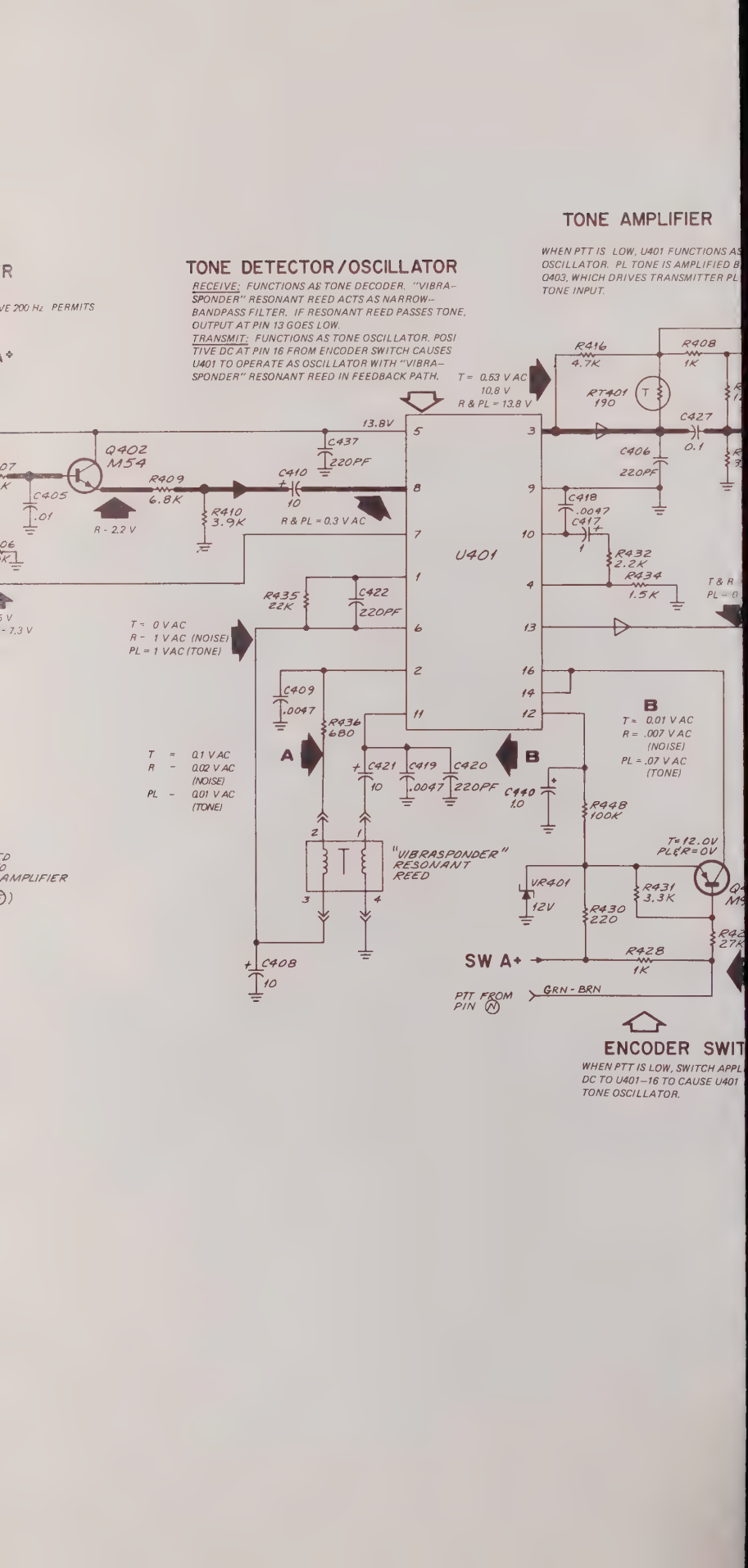
LOW PASS ACTIVE FIL

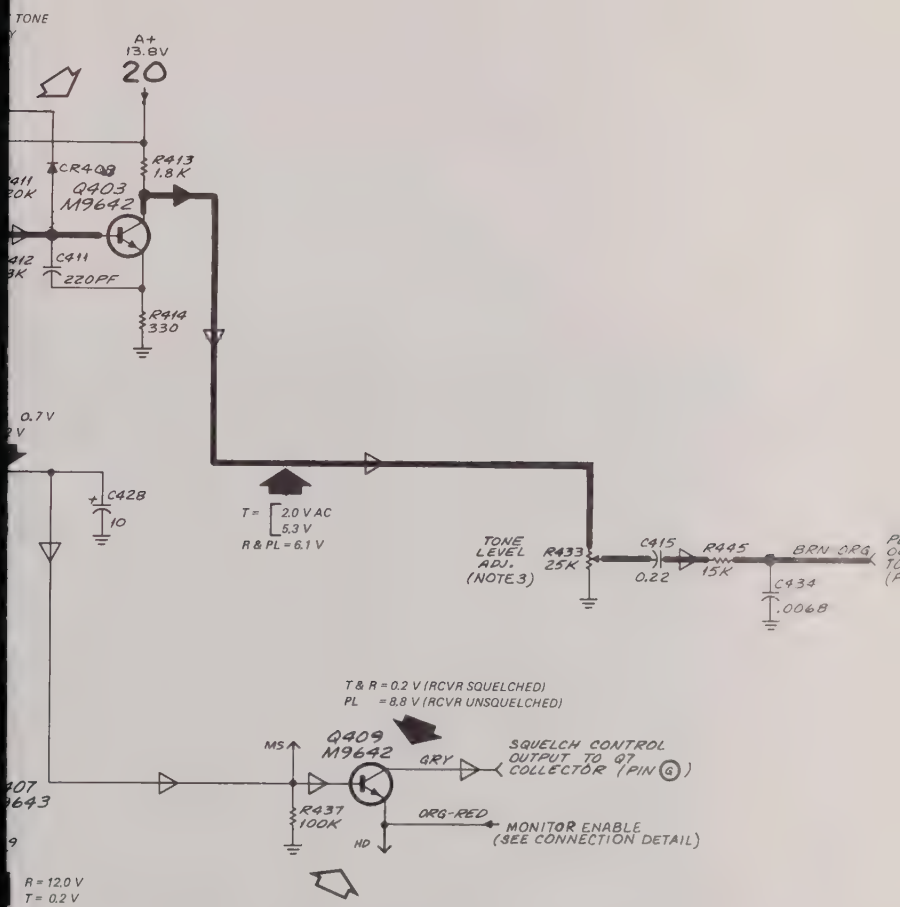




HIGH-PASS FILTER

PASSES AUDIO FREQUENCIES ABOVE 300 Hz. PREVENTS PL TONE FROM BEING HEARD IN RCVR AUDIO.


TONE AMPLIFIER
WHEN PTT IS LOW, U401 FUNCTIONS AS
OSCILLATOR. PL TONE IS AMPLIFIED B
Q403, WHICH DRIVES TRANSMITTER PL
TONE INPUT.
TONE DETECTOR/OSCILLATOR
RECEIVE: FUNCTIONS AS TONE DECODER. "VIBRA-
SPONDER" RESONANT REED ACTS AS NARROW-
BANDPASS FILTER. IF RESONANT REED PASSES TONE,
OUTPUT AT PIN 13 GOES LOW.
TRANSMIT: FUNCTIONS AS TONE OSCILLATOR. POSI
TIVE DC AT PIN 16 FROM ENCODER SWITCH CAUSES
U401 TO OPERATE AS OSCILLATOR WITH "VIBRA-
SPONDER" RESONANT REED IN FEEDBACK PATH.
T = 0.53 V AC
10.8 V
R & PL = 13.8 V
R416
4.7K
R408
1K
RT401
190
C427
0.1
C406
220PF
13.8V
Q402
M54
C437
220PF
C405
.01
R409
6.8K
C410
10
R410
3.9K
R & PL = 0.3 V AC
R - 2.2 V
C418
.0047
C417
1
R432
2.2K
R434
1.5K
U401
R435
22K
C422
220PF
T = 0 V AC
R - 1 V AC (NOISE)
PL = 1 V AC (TONE)
C409
.0047
R436
680
B
T = 0.01 V AC
R = .007 V AC
(NOISE)
PL = .07 V AC
(TONE)
A
T = 0.1 V AC
R - 0.02 V AC
(NOISE)
PL - 0.01 V AC
(TONE)
C421
10
C419
.0047
C420
220PF
C440
1.0
R448
100K
T=12.0V
PL&R=0V
"VIBRASPONDER"
RESONANT
REED
VR401
12V
R431
3.3K
R430
220
R428
1K
C408
10
SW A+
PTT FROM
PIN (N)
GRN - BRN
ENCODER SWIT
WHEN PTT IS LOW, SWITCH APPL
DC TO U401-16 TO CAUSE U401
TONE OSCILLATOR.



R = 12.0 V
T = 0.2 V

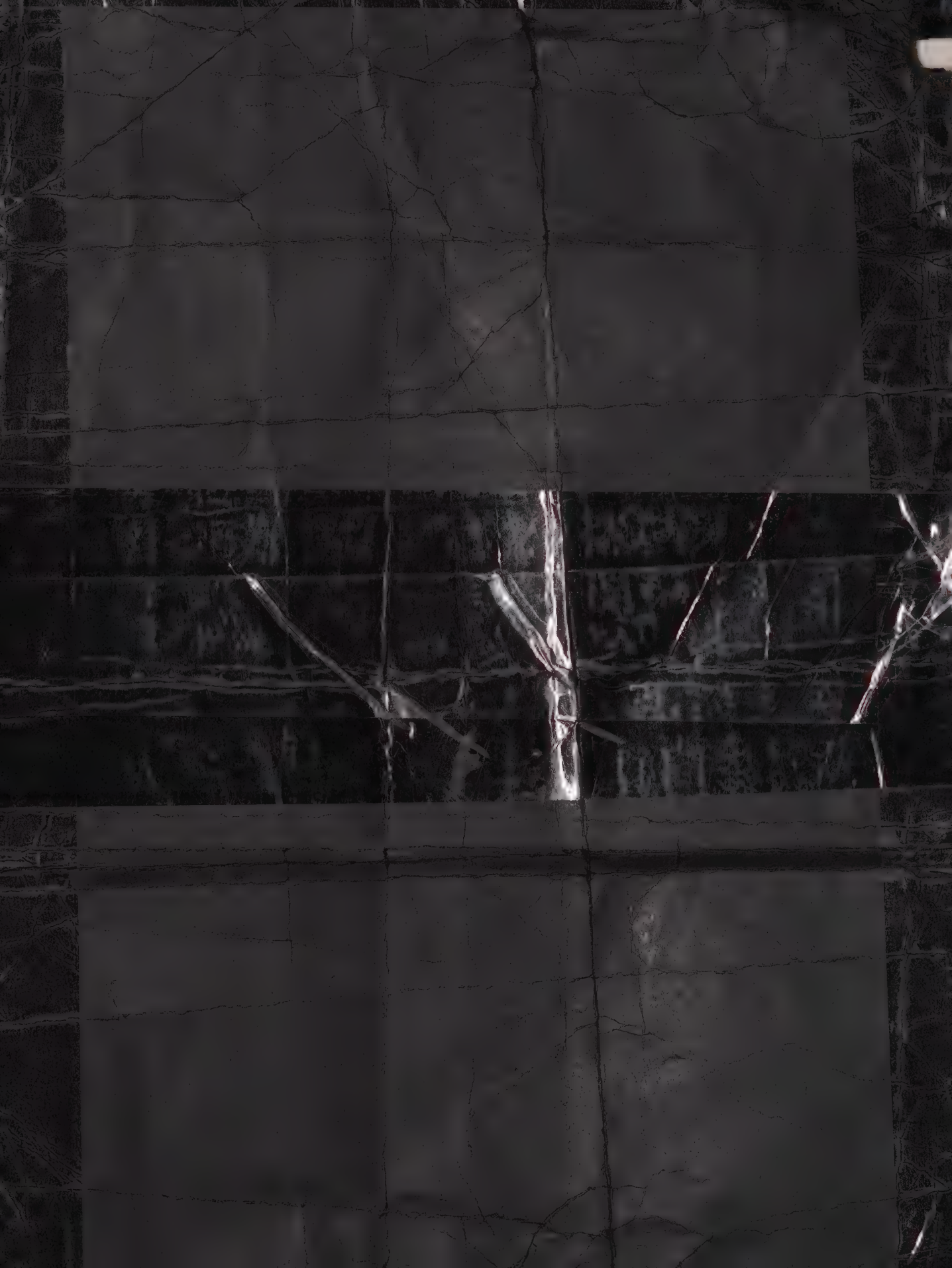
SQUELCH SWITCH

THE RECEIVER IS UNSQUELCHED (Q409 OFF) WHEN EITHER U401 DETECTS THE PROPER PL TONE OR THE MONITOR ENABLE LINE IS NOT LOW

EEPS-23517-O

CH

ES POSITIVE
O FUNCTION AS PL



"DIGITAL PRIVATE-LINE" ENCODER/DECODER

MODEL TRN6906A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

PARTS LIST

TRN6906A "Digital Private-Line" Encoder/Decoder — PL-5335-O

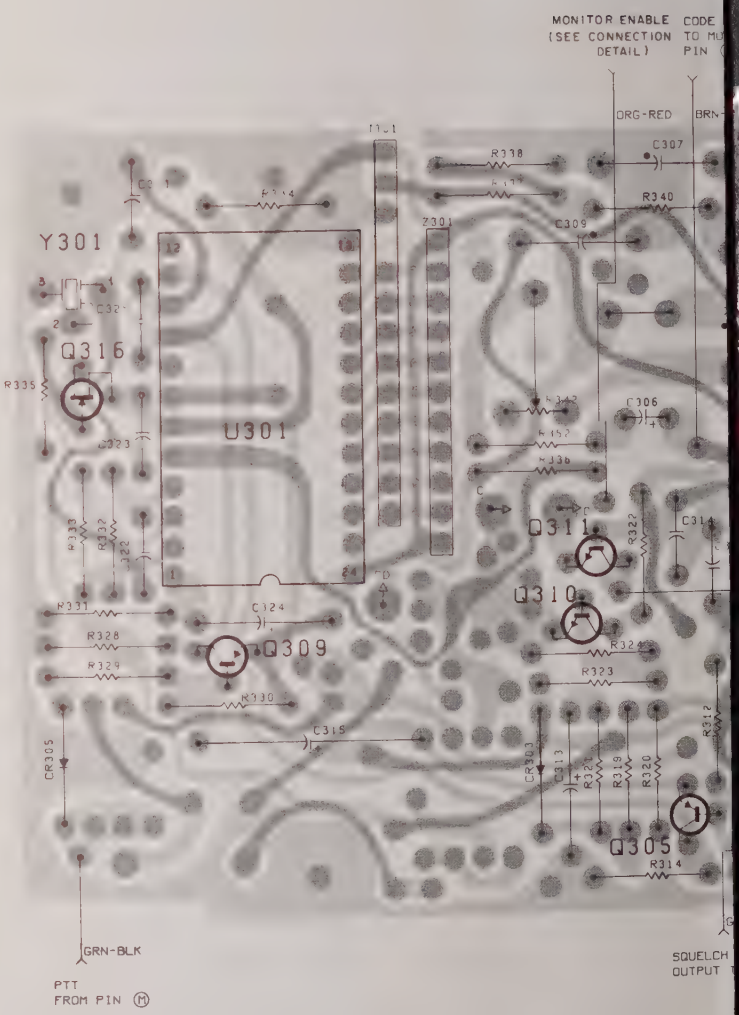
		CAPACITOR, fixed: uF ±5%; 50 V; unless otherwise stated
C301	23-84665F02	15 +100-0%; 35 V
C302	8-82905G39	.023
C303	8-83813H23	.068
C304	8-83813H19	.0039
C305	23-84665F01	10 +100-0%; 35 V
C306	23-84665F02	15 +100-0%; 35 V
C307	8-83813H27	.0033
C308	8-83813H24	.036
C309	8-83813H14	.043
C310	23-82783B48	0.68; 35 V
C311, 312	21-82187B20	.001 ±10%; 100 V
C313	23-84762H07	4.7 ±20%; 10 V
C314	21-82428B59	.01 +80-20%; 200 V
C315	23-82783B27	10 ±10%; 25 V
C316		NOT USED
C317, 318	21-82428B59	.01 +80-20%; 200 V
C319	23-84665F02	15 +100-0%; 35 V
C320	21-82428B59	.01 +80-20%; 200 V
C321	21-83798B01	100 pF; 200 V
C322	21-840849	20 pF; 500 V
C323	21-82428B09	.0047 ±10%; 100 V
C324	23-82783B08	1 ±20%; 35 V
C325	21-82187B20	.001 ±10%; 100 V
C326, 327		NOT USED
C328	21-82187B20	.001 ±10%; 100 V
C329	8-83813H26	.0056
C330	8-82905G32	0.22 ±10%; 50 V
C331	21-82428B59	.01 +80-20%; 200 V
C332	8-83813H26	.0056
C333 thru 342		NOT USED
C343	21-82877B24	220 pF
C344, 345	21-83596E10	220 pF ±10%; 500 V
C346	21-82877B24	220 pF
		DIODE: (SEE NOTE I)
CR301, 302	48-84616A01	hot carrier
CR303	48-83654H01	silicon
CR304, 306		NOT USED
CR305, 307	48-83654H01	silicon
CR308 thru 310		NOT USED
CR311	48-83654H01	silicon
		SOCKET:
J301	9-82071K01	female; 12 contact
Q301	48-869643	TRANSISTOR: (SE PNP; type M9643
Q302, 303	48-869642	NPN; type M9642
Q304, 305	48-869643	PNP; type M9643
Q306	48-869642	NPN; type M9642
Q307, 309	48-869643	PNP; type M9643
Q308		NOT USED
Q310, 311	48-869642	NPN; type M9642
Q312 thru 314		NOT USED
Q315	48-869642	NPN; type M9642
Q316	48-869653	field-effect; M9653
Q317	48-869648	NPN; type M9648
		RESISTOR, fixed: unless otherwise st
R301		NOT USED
R302	6-124A95	82k
R303	6-124A90	51k
R304	6-124A56	2.0k
R305		(factory selected)
R306, 307, 308	6-13755D64	56.2k ±1%
R309	6-124A55	1.8k
R310, 311	6-124A73	10k
R312	6-124C59	2.7k ±10%
R313	6-124C73	10k ±10%
R314	6-124C83	27k ±10%
R315	6-13755D80	82.5k
R316	6-124B14	470k
R317	6-124A75	12k
R318	6-124A89	47k
R319	6-124A99	120k
R320, 321	6-124C95	82k ±10%
R322	6-124C89	47k ±10%
R323	6-124A99	120k
R324	6-124C95	82k ±10%
R325, 326, 327		NOT USED
R328	6-124C73	10k ±10%
R329	6-124A81	22k
R330	6-124A83	27k
R331	6-124C97	100k ±10%
R332	6-124B14	470k
R333	6-124B04	1[illegible]k
R334	6-124A77	15k
R335	6-124B14	470k
R336	6-124A91	56k
R337	6-124A97	100k
R338	6-124A99	120k
R339		NOT USED
R340, 341	6-124A97	100k
R342	18-84944C01	var; 2k
R343	6-124C33	220 ±1[illegible]
R344	6-124C37	330 ±10%
R345, 346		NOT USED
R347	6-124B12	390k
R348 thru 350		NOT USED
R351, 352	6-124C81	22k ±10%
		INTEGRATED CIR (SEE NOTE I)
U301	51-84267A82	type M[illegible]
U302	51-84320A55	type MC[illegible]
U303	51-84320A79	type CA[illegible]AE
		NETWORK:
Z301	51-82142K02	resistive
		CRYSTAL: (SEE resonator: 50.00
Y301	48-82003K01	
		VOLTAGE REGUL
VR301	48-82256C34	Zener type 11.0
VR302	48-83696E07	Zener type [illegible].2 V

NOTES:

I. Replacement diodes, transistors, and integrated circuits must be ordered by Motorola part number for performance.

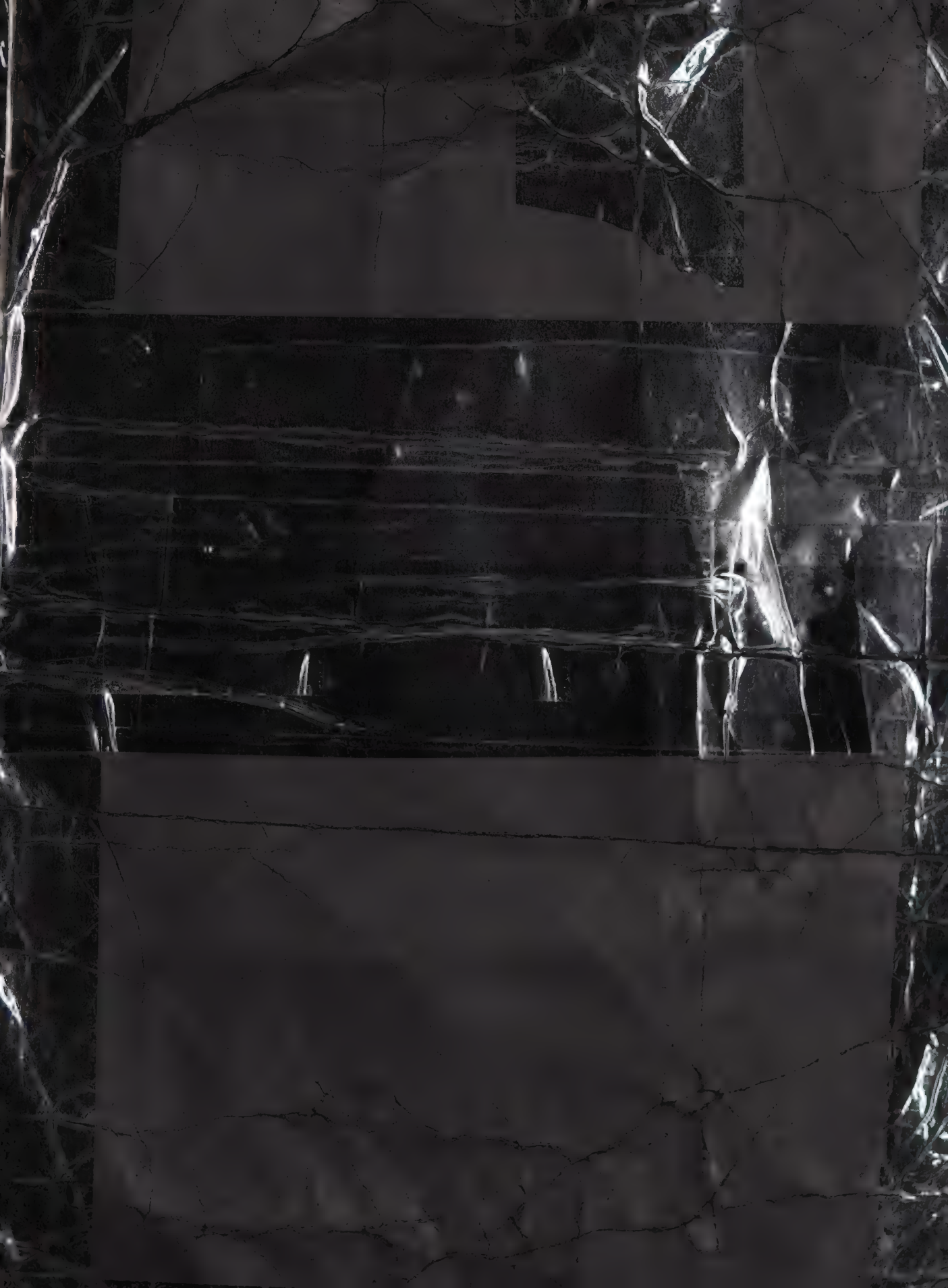
II. When ordering crystal units, specify carrier frequency, crystal frequency and crystal type number.

68P81034E53-O
(Sheet 1 of 2)
3/31/77-NPC

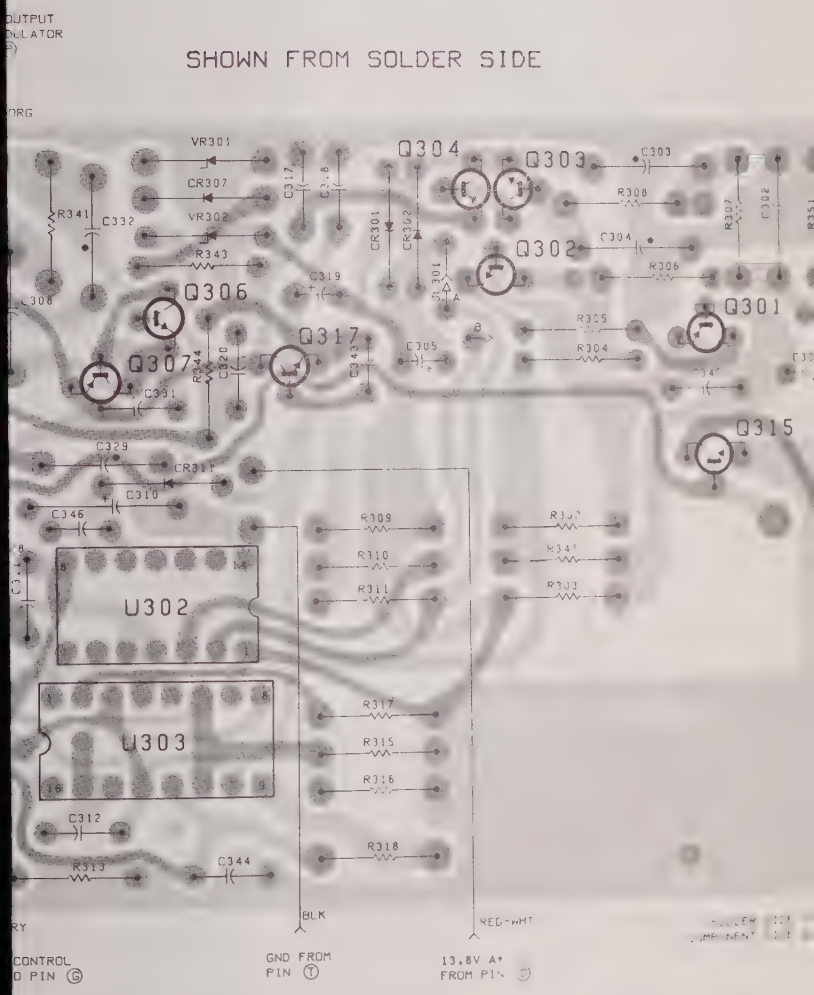


NOTES

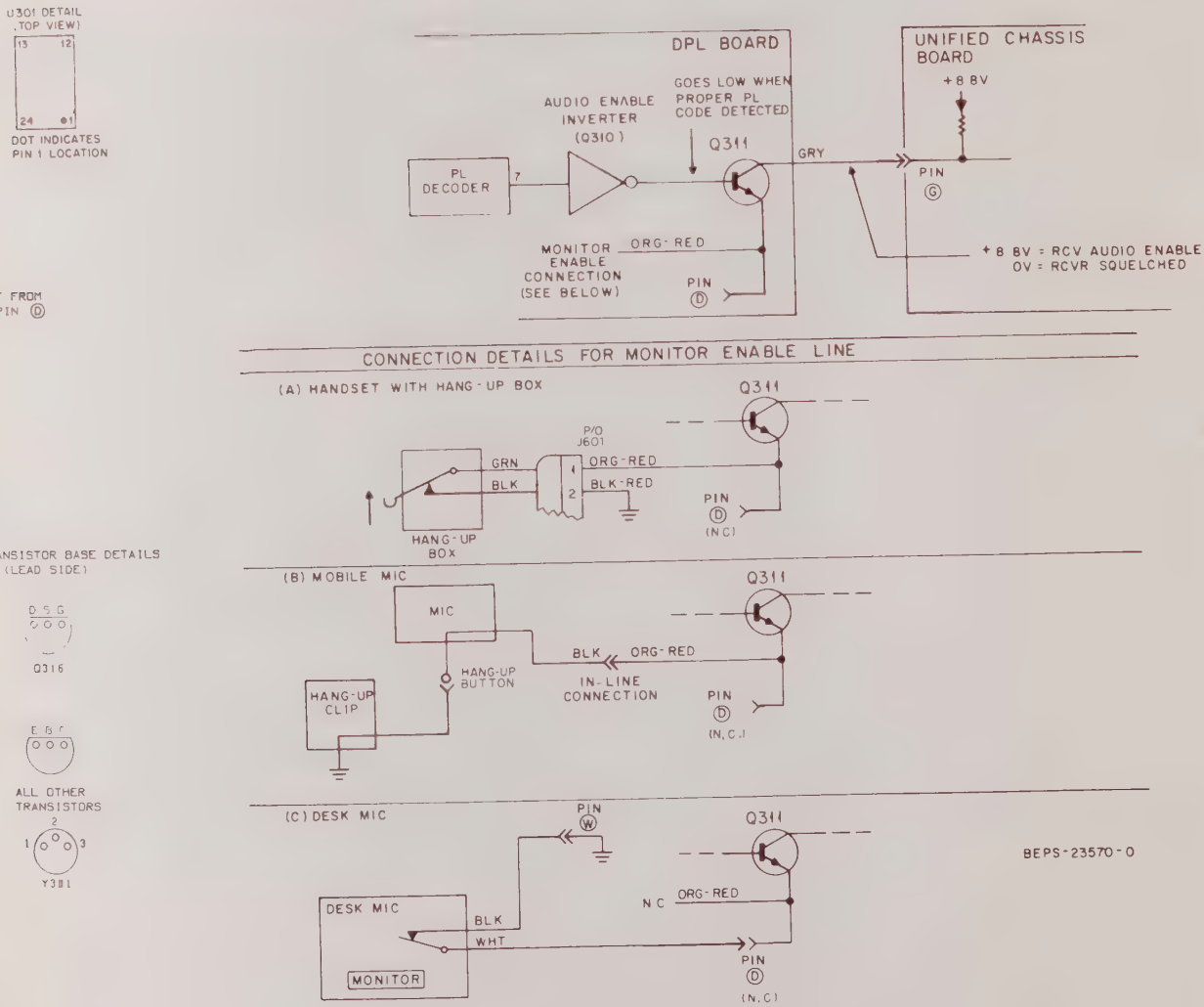
1. SOME MYLAR CAPACITORS ARE SHOWN WITH ONE PLATE MARKED WITH A DOT. THE DOT ON THE SYMBOL CORRESPONDS TO A DOT ON THE CAPACITOR BODY WHICH IDENTIFIES THE OUTER FOIL LEAD.



SHOWN FROM SOLDER SIDE



MONITOR ENABLE CONNECTION DETAIL



NOTES

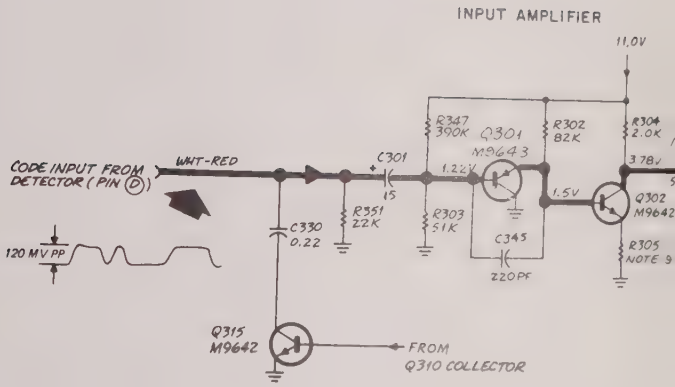
1. UNLESS OTHER
RESISTOR VALU
CAPACITOR VA

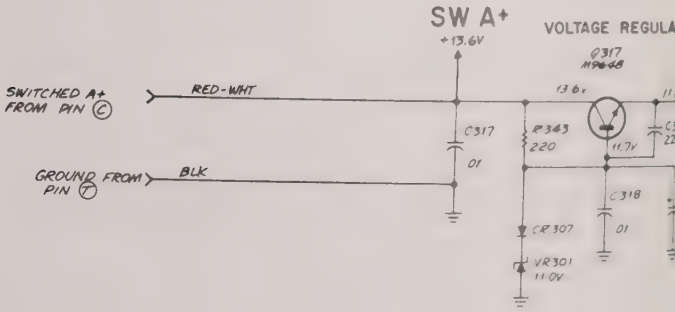
2. TRANSISTORS I
CIRCUIT ARE PA

3. WAVEFORMS
CHANNEL RF SI
CONNECTOR,
AND A DIGITALL
DEVIATION

4. DC VOLTAGES M
IMPEDANCE MU
IMPEDANCE), VO
ARE FOR RECEI

5. U301 IS A CMOS
PRECAUTIONS O





6. TO OBTAIN ACCURATE MEASUREMENT OF TRANSMITTER DEVIATION IN RADIOS EQUIPPED WITH "DIGITAL PRIVATE–LINE" BINARY–CODED SQUELCH, THE FREQUENCY RESPONSE OF THE DEVIATION MEASURING EQUIPMENT MUST BE < 1 Hz. DETAILED INSTRUCTIONS ON DEVIATION ADJUSTMENT ARE PROVIDED IN THE TRANSMITTER ALIGNMENT SECTION OF THIS MANUAL.

7. JU301 IS NORMALLY CONNECTED TO POINT A. CONNECT JU301 TO POINT B TO DECODE INVERTED CODES.

8. THE CODE DISABLE POINTS INDICATED ON THE SCHEMATIC DIAGRAM (U301 OUTPUT LINE) ARE CIRCUIT BOARD PLATING PADS. THESE PADS ARE SHORTED TOGETHER TO DISABLE THE DIGITAL PL CODE WHEN SETTING TRANSMITTER FREQUENCY AND AT TIMES WHEN SETTING MODULATION DEVIATION.

9. RESISTOR R305 FACTORY SELECTED

LEGEND
= THEORY OF OPERATION DATA
= MAINTENANCE DATA
= RECEIVED CODE SIGNAL
= TRANSMIT CODE SIGNAL
= PTT CONTROL
= AUDIO ENABLE CONTROL

U303
16 GND
15
A
1
2

U302 -5 DATA CONDITIONER OUTPUT
~10.0 V DC
~5.0 V P-P
~4.9 V DC
C321 100PF
C322 20PF

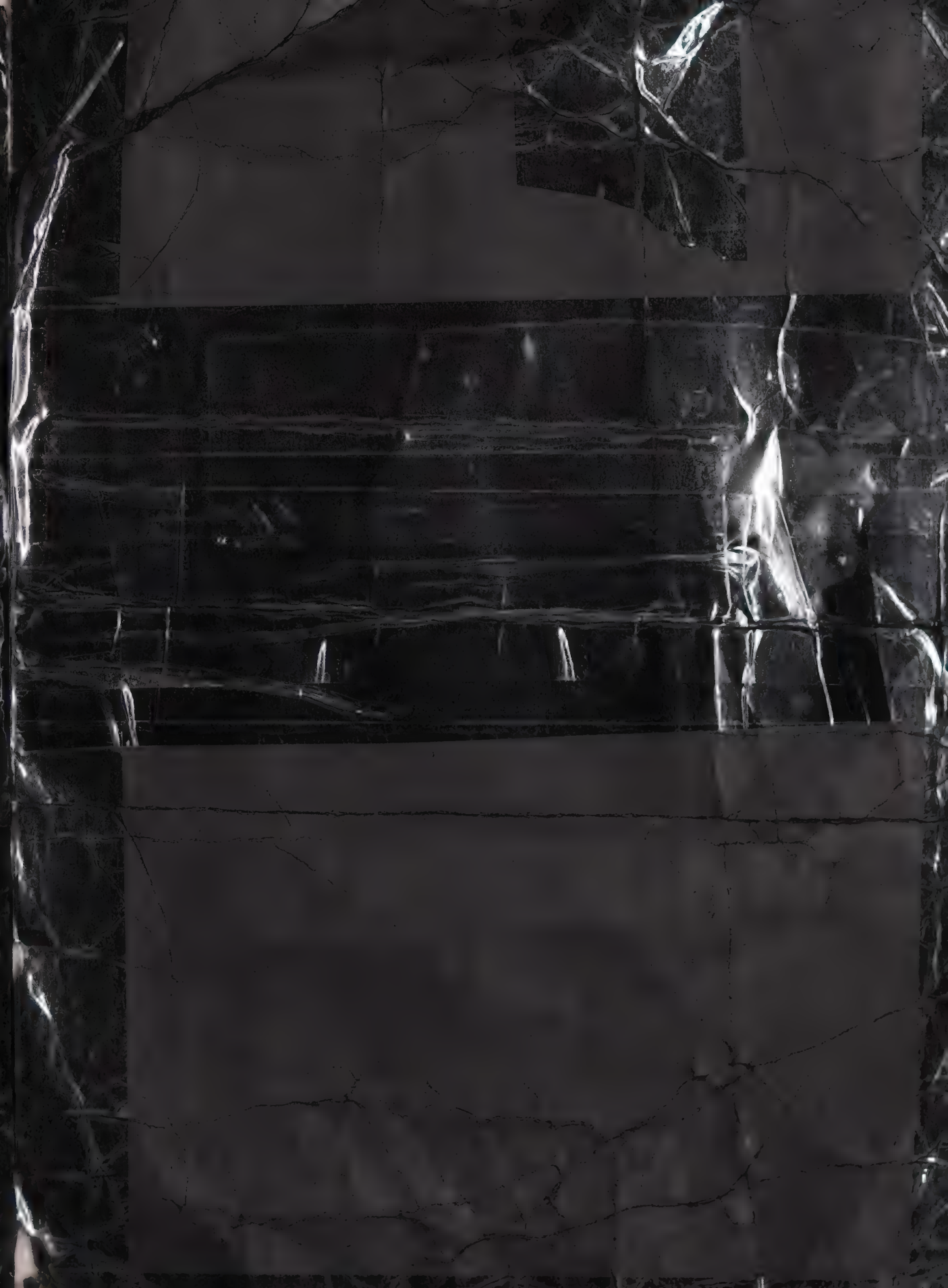
SW A+
13.6V
FILTER AMPLIFIER
Q303 M9642
Q304 M9643
FILTER OUTPUT
0.6 V P-P
DATA CONDITIONER
U302 PROVIDES SQUARING OF INPUT DATA.
DATA INVERTER
Q305 M9643

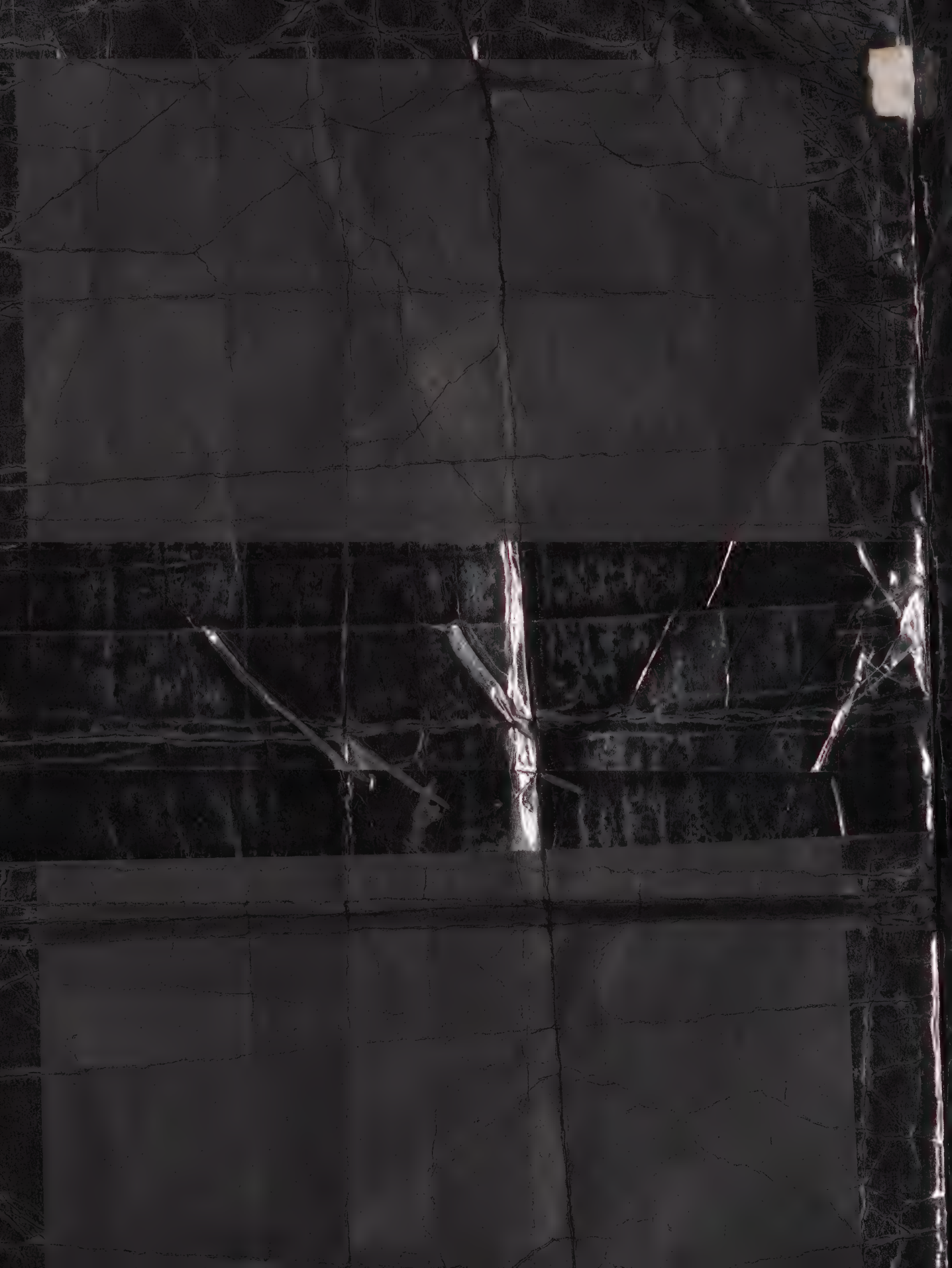
140 HZ 3-POLE LOW-PASS FILTER
R307 6.2K
R308 56.2K
C303 .068
C304 .0039
3.4V
R309 1.8K
R310 10K 3.2V
R311 10K 3.2V
JU301 (NOTE 7)
U302
R312 2.7K
R313 10K
CR301
CR302
C305 10
C346 220PF
CR311
C310 0.68
11.0V
9.3V
C311 .001
C328 .001
TIMING CAPACITOR C310 CHARGE–DISCHARGE
~7.0 V
1.9 V PK-PK
~5.0 V

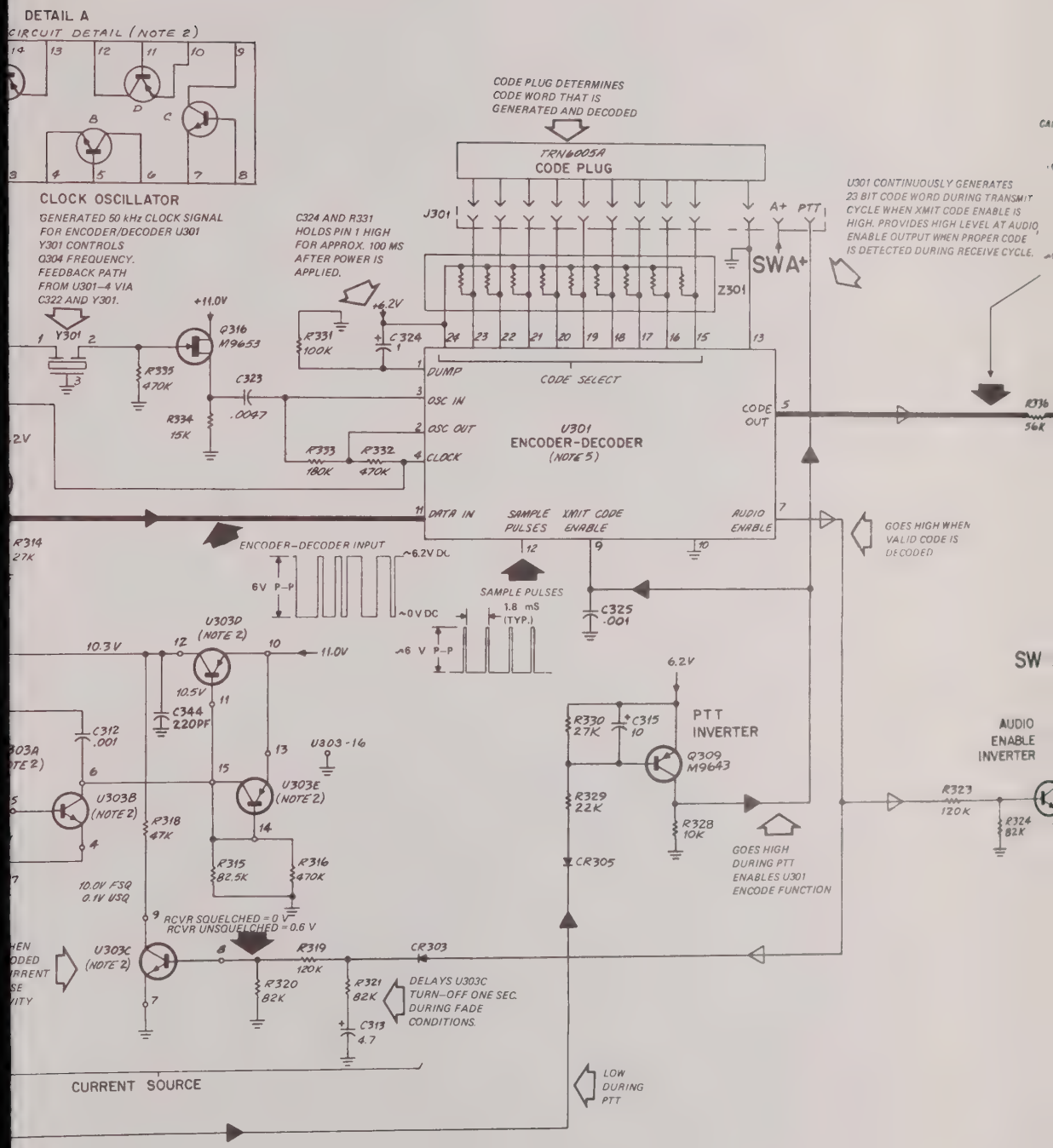
+11.0
+6.2V
R344 330
VR302 6.2V
C320 .01

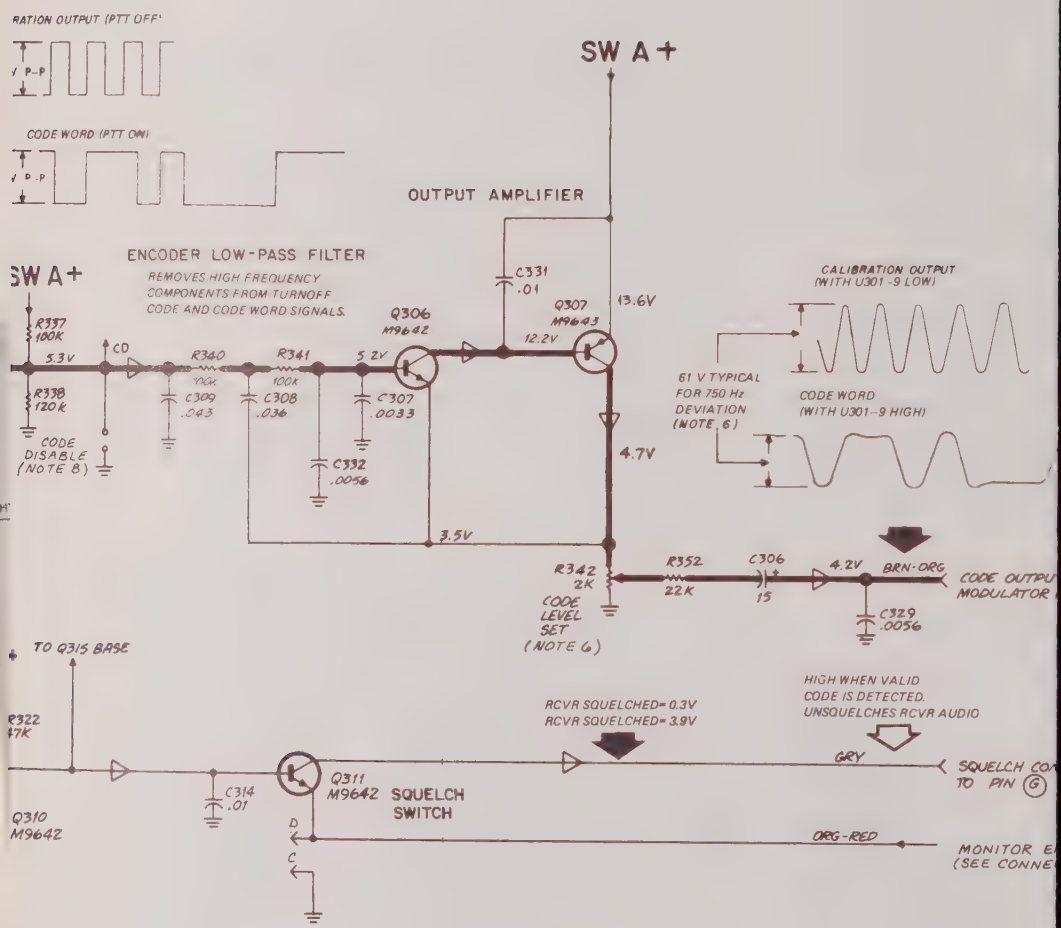
DATA CONDITIONER ERROR VOLTAGE (PIN 7)
1.7 V P-P MIN.
~10 V DC
~8.3 V DC

U303C TURNS ON W
VALID CODE IS DEC
AND DECREASES CU
TO U302 TO INCREA
DECODING SENSITI

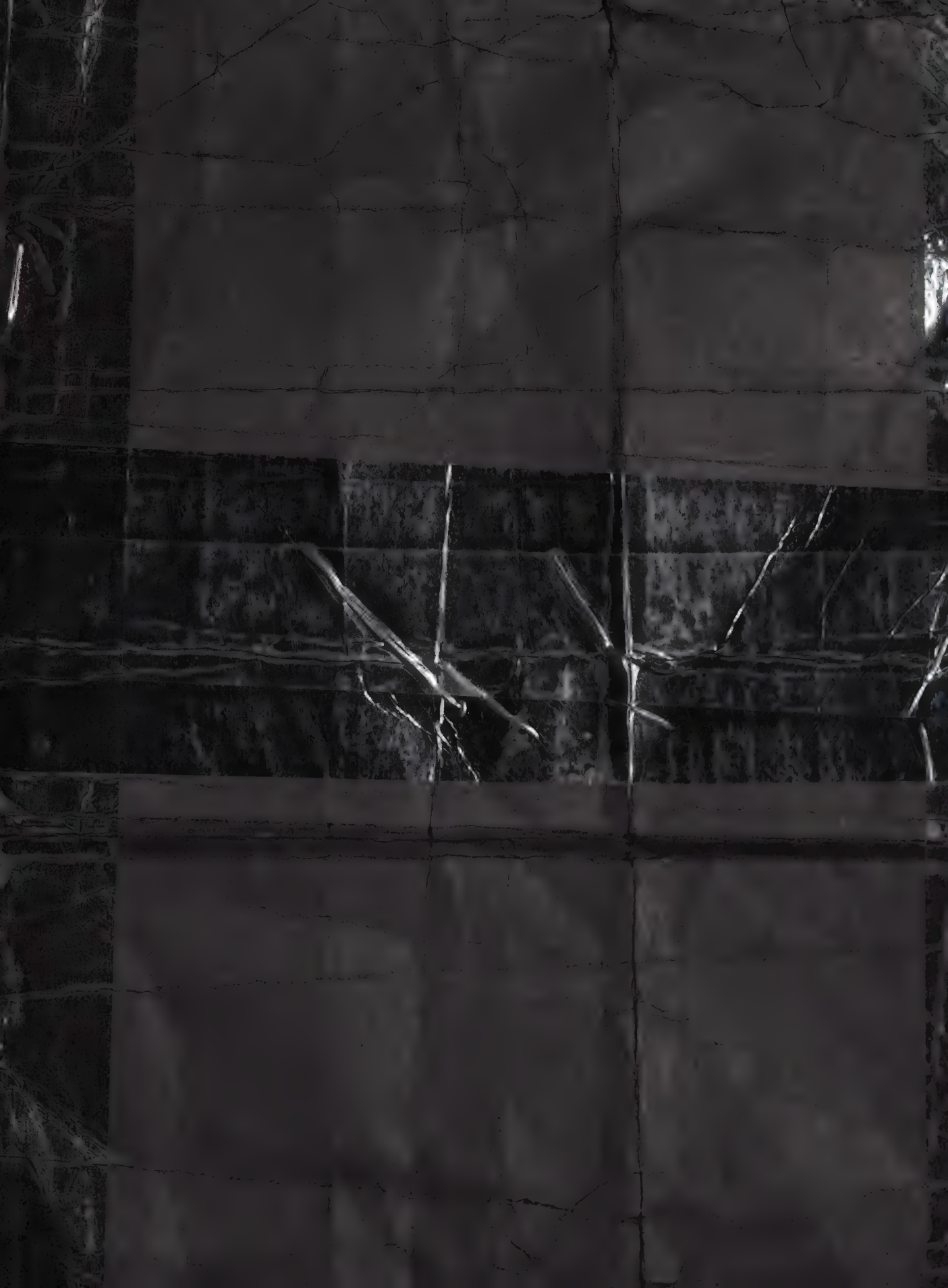





DETAIL A
CIRCUIT DETAIL (NOTE 2)
CLOCK OSCILLATOR
GENERATED 50 kHz CLOCK SIGNAL FOR ENCODER/DECODER U301 Y301 CONTROLS Q304 FREQUENCY. FEEDBACK PATH FROM U301-4 VIA C322 AND Y301.
C324 AND R331 HOLDS PIN 1 HIGH FOR APPROX. 100 MS AFTER POWER IS APPLIED.
CODE PLUG DETERMINES CODE WORD THAT IS GENERATED AND DECODED
TRN6005A CODE PLUG
J301
Z301
SWA+
A+
PTT
U301 CONTINUOUSLY GENERATES 23 BIT CODE WORD DURING TRANSMIT CYCLE WHEN XMIT CODE ENABLE IS HIGH. PROVIDES HIGH LEVEL AT AUDIO ENABLE OUTPUT WHEN PROPER CODE IS DETECTED DURING RECEIVE CYCLE.
+11.0V
Q316 M9653
Y301
R335 470K
R334 15K
C323 .0047
+6.2V
R331 100K
C324
DUMP
OSC IN
OSC OUT
CLOCK
CODE SELECT
U301 ENCODER-DECODER (NOTE 5)
CODE OUT
R336 56K
DATA IN
SAMPLE PULSES
XMIT CODE ENABLE
AUDIO ENABLE
GOES HIGH WHEN VALID CODE IS DECODED
R333 180K
R332 470K
R314 27K
ENCODER-DECODER INPUT
6V P-P
~6.2V DC.
~0V DC
SAMPLE PULSES
1.8 mS (TYP.)
~6 V P-P
C325 .001
U303D (NOTE 2)
10.3V
11.0V
10.5V
C344 220PF
C312 .001
U303-16
U303A (NOTE 2)
U303B (NOTE 2)
U303E (NOTE 2)
R318 47K
R315 82.5K
R316 470K
10.0V FSQ
0.1V USQ
RCVR SQUELCHED = 0 V
RCVR UNSQUELCHED = 0.6 V
U303C (NOTE 2)
R319 120K
CR303
R320 82K
R321 82K
C313 4.7
DELAYS U303C TURN-OFF ONE SEC. DURING FADE CONDITIONS.
CURRENT SOURCE
LOW DURING PTT
6.2V
R330 27K
C315 10
PTT INVERTER
Q309 M9643
R329 22K
R328 10K
CR305
GOES HIGH DURING PTT ENABLES U301 ENCODE FUNCTION
AUDIO ENABLE INVERTER
R323 120K
R324 82K
SW


RATION OUTPUT (PTT OFF)
V P-P
CODE WORD (PTT ON)
V P-P
SW A+
OUTPUT AMPLIFIER
ENCODER LOW-PASS FILTER
REMOVES HIGH FREQUENCY COMPONENTS FROM TURNOFF CODE AND CODE WORD SIGNALS.
SW A+
R337 100K
5.3V
CD
R340 100K
R341 100K
5.2V
C331 .01
Q306 M9642
Q307 M9643
13.6V
12.2V
R338 120K
CODE DISABLE (NOTE 8)
C309 .043
C308 .036
C307 .0033
C332 .0056
4.7V
3.5V
CALIBRATION OUTPUT (WITH U301-9 LOW)
61 V TYPICAL FOR 750 Hz DEVIATION (NOTE 6)
CODE WORD (WITH U301-9 HIGH)
R342 2K
CODE LEVEL SET (NOTE 6)
R352 22K
C306 15
4.2V
BRN-ORG
CODE OUTPUT MODULATOR
C329 .0056
TO Q315 BASE
R322 47K
Q310 M9642
C314 .01
Q311 M9642 SQUELCH SWITCH
RCVR SQUELCHED = 0.3V
RCVR SQUELCHED = 3.9V
HIGH WHEN VALID CODE IS DETECTED. UNSQUELCHES RCVR AUDIO
GRY
SQUELCH CO
TO PIN (G)
D
C
ORG-RED
MONITOR E
(SEE CONNE

EEPS-23520-O



"DIGITAL PRIVATE-LINE" ENCODER/DECODER

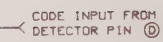
MODEL TRN6906A

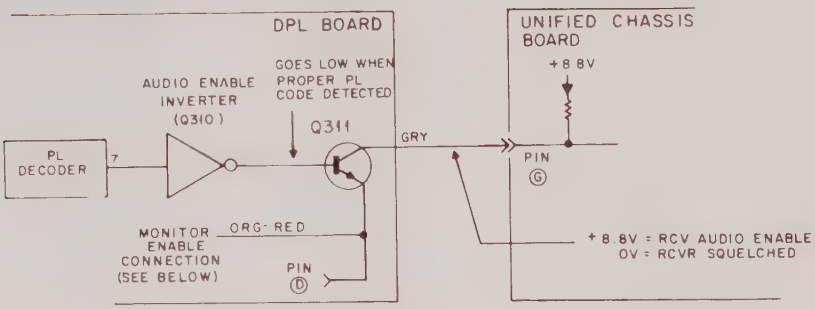
FUNCTION

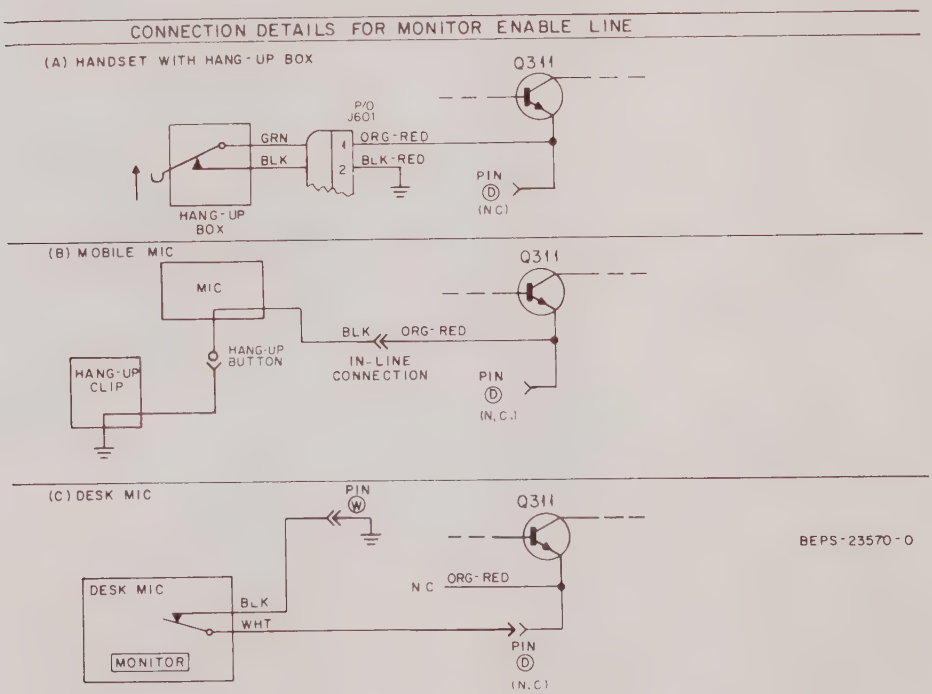
Encodes and decodes "Digital Private-Line" codes. Encoder modulates transmitter. Decoder detects received tone and unsquelches receiver when proper code is received.

68P81034E53-O
(Sheet 2 of 2)
3/31/77-NPC

MONITOR ENABLE CONNECTION DETAIL







TRANSISTOR BASE DETAILS
(LEAD SIDE)

ALL OTHER
TRANSISTORS

BEPS-23570-O

NOTES

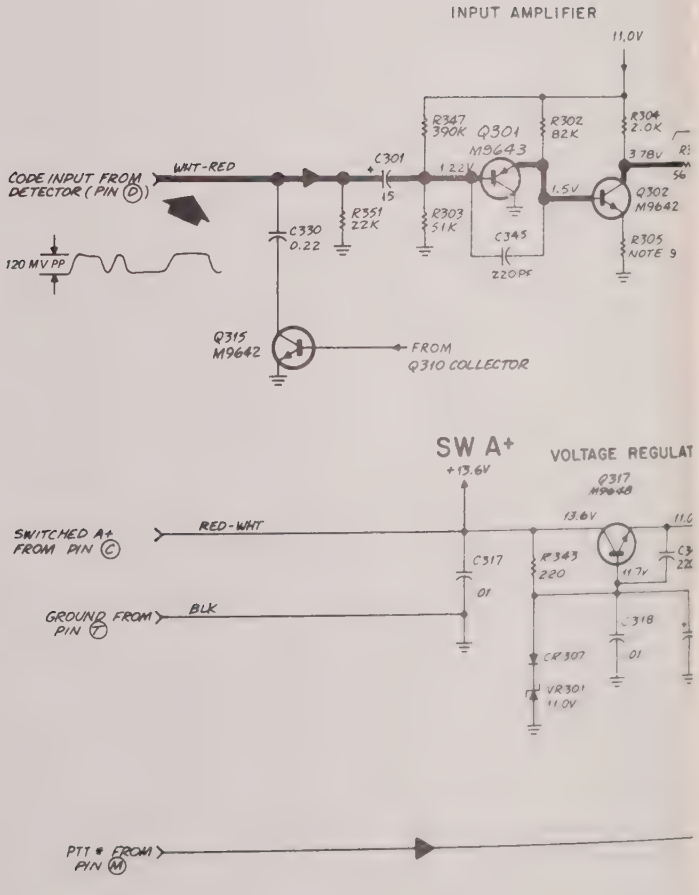
1. UNLESS OTHERWISE
   RESISTOR VALUES A
   CAPACITOR VALUES

2. TRANSISTORS IN CU
   CIRCUIT ARE PART C

3. WAVEFORMS ARE
   CHANNEL RF SIGNAL
   CONNECTOR, MODUL
   AND A DIGITALLY CO
   DEVIATION

4. DC VOLTAGES MEAS
   IMPEDANCE MULTIM
   IMPEDANCE), VOLTA
   ARE FOR RECEIVE M

5. U301 IS A CMOS DEVI
   PRECAUTIONS ON TH



INDICATED
RE IN OHMS,
ARE IN MICROFARADS

RRENT SOURCE
F U303. SEE DETAIL A

AKEN WITH AN ON
OF 1000 uV. AT ANTENNA
ATED WITH 1000 Hz
DED SQUELCH SIGNAL AT ±5 kHz

JRED WITH A HIGH
ETER (11 MEGOHM INPUT
ES IN PARENTHESES
ODE

CE. REFER TO THE HANDLING
E BACK OF THIS PAGE

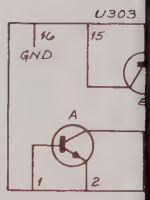
6 TO OBTAIN ACCURATE MEASUREMENT OF TRANSMITTER DEVIATION IN RADIOS EQUIPPED WITH "DIGITAL PRIVATE–LINE" BINARY–CODED SQUELCH, THE FREQUENCY RESPONSE OF THE DEVIATION MEASURING EQUIPMENT MUST BE < 1 Hz. DETAILED INSTRUCTIONS ON DEVIATION ADJUSTMENT ARE PROVIDED IN THE TRANSMITTER ALIGNMENT SECTION OF THIS MANUAL.

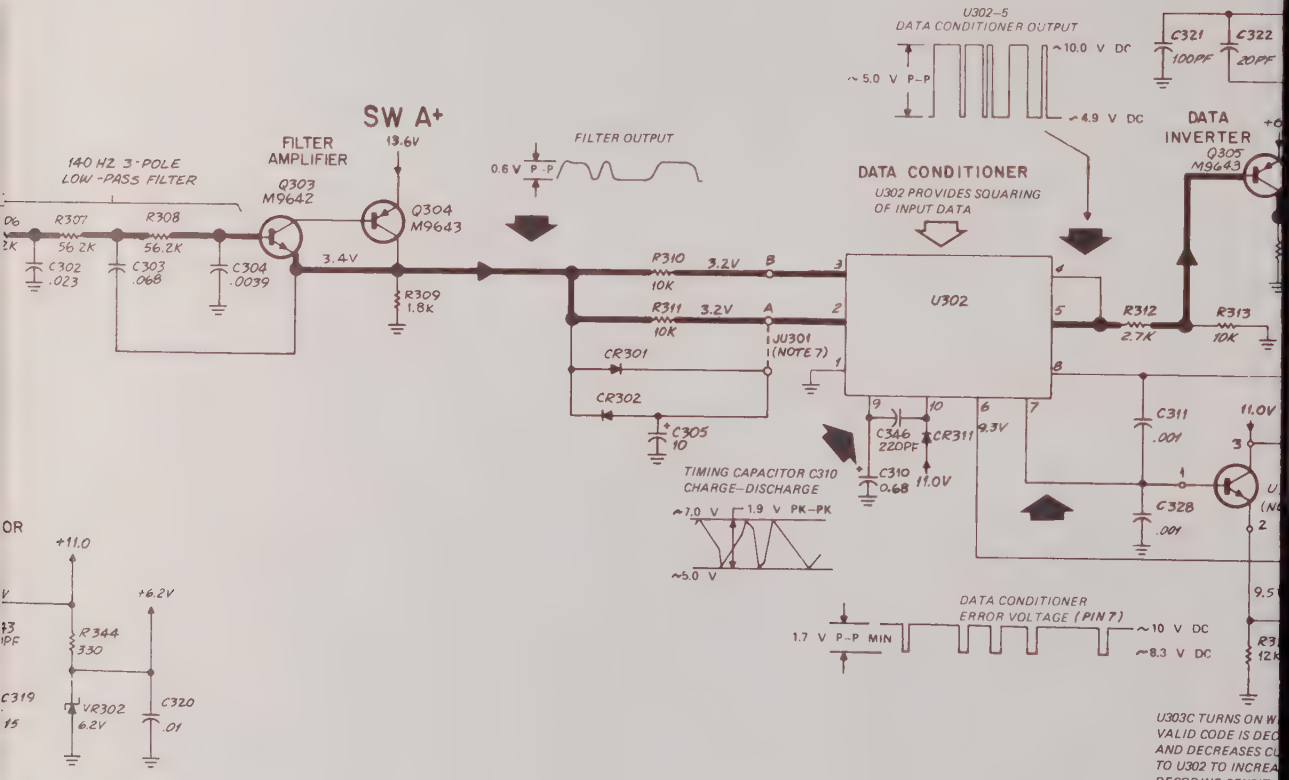
7 JU301 IS NORMALLY CONNECTED TO POINT A. CONNECT JU301 TO POINT B TO DECODE INVERTED CODES.

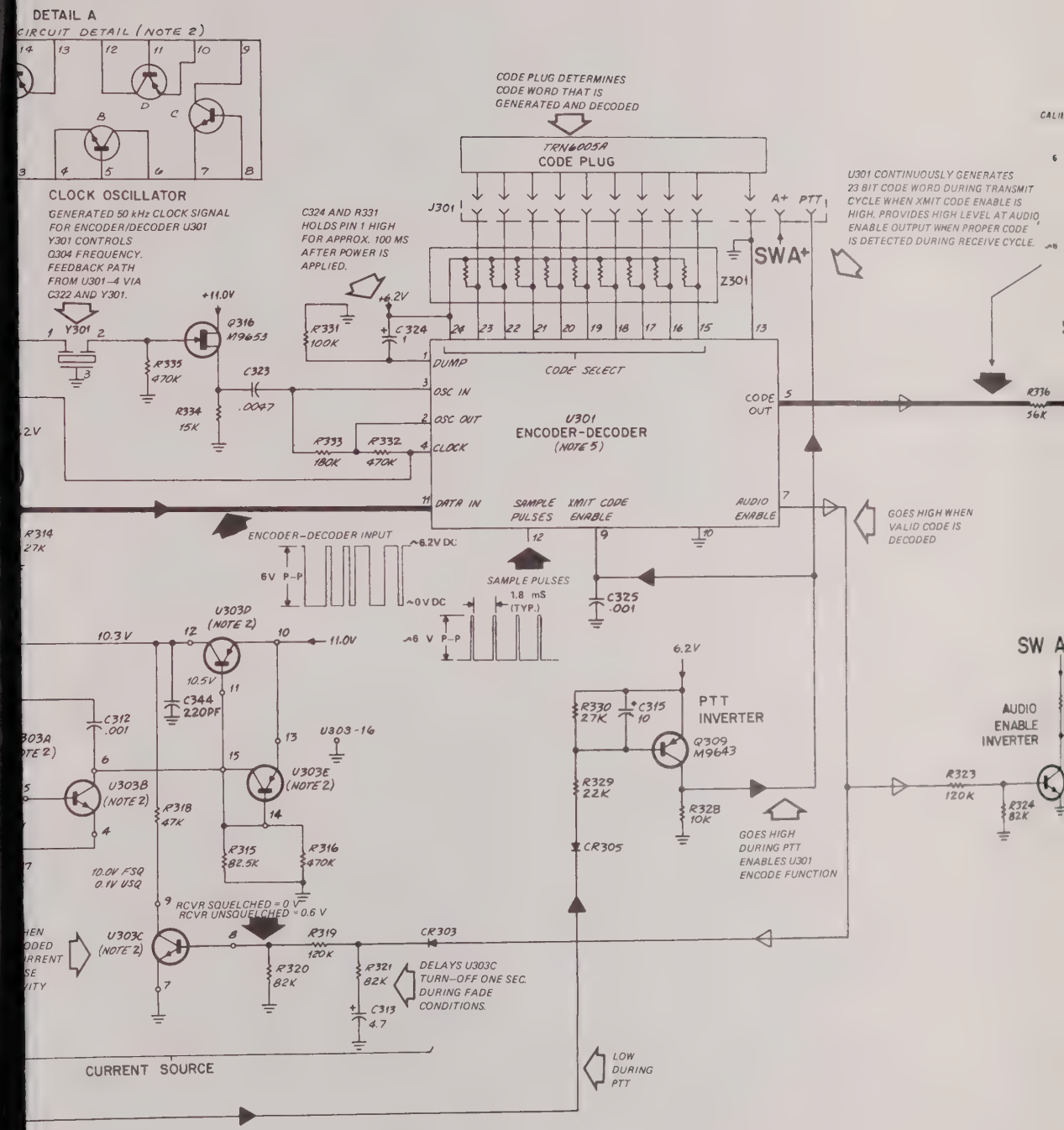
8 THE CODE DISABLE POINTS INDICATED ON THE SCHEMATIC DIAGRAM (U301 OUTPUT LINE) ARE CIRCUIT BOARD PLATING PADS. THESE PADS ARE SHORTED TOGETHER TO DISABLE THE DIGITAL PL CODE WHEN SETTING TRANSMITTER FREQUENCY AND AT TIMES WHEN SETTING MODULATION DEVIATION.

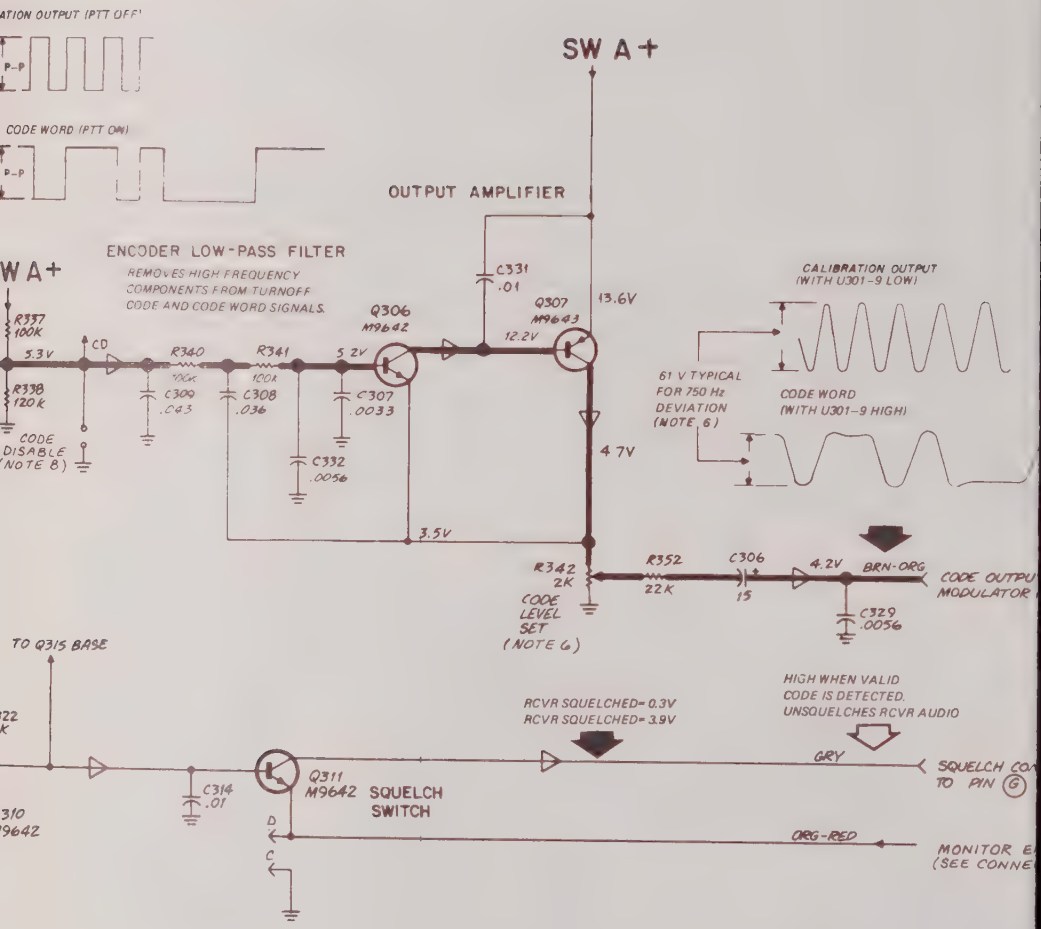
9 RESISTOR R305 FACTORY SELECTED

LEGEND
- = THEORY OF OPERATION DATA
- = MAINTENANCE DATA
- = RECEIVED CODE SIGNAL
- = TRANSMIT CODE SIGNAL
- = PTT CONTROL
- = AUDIO ENABLE CONTROL

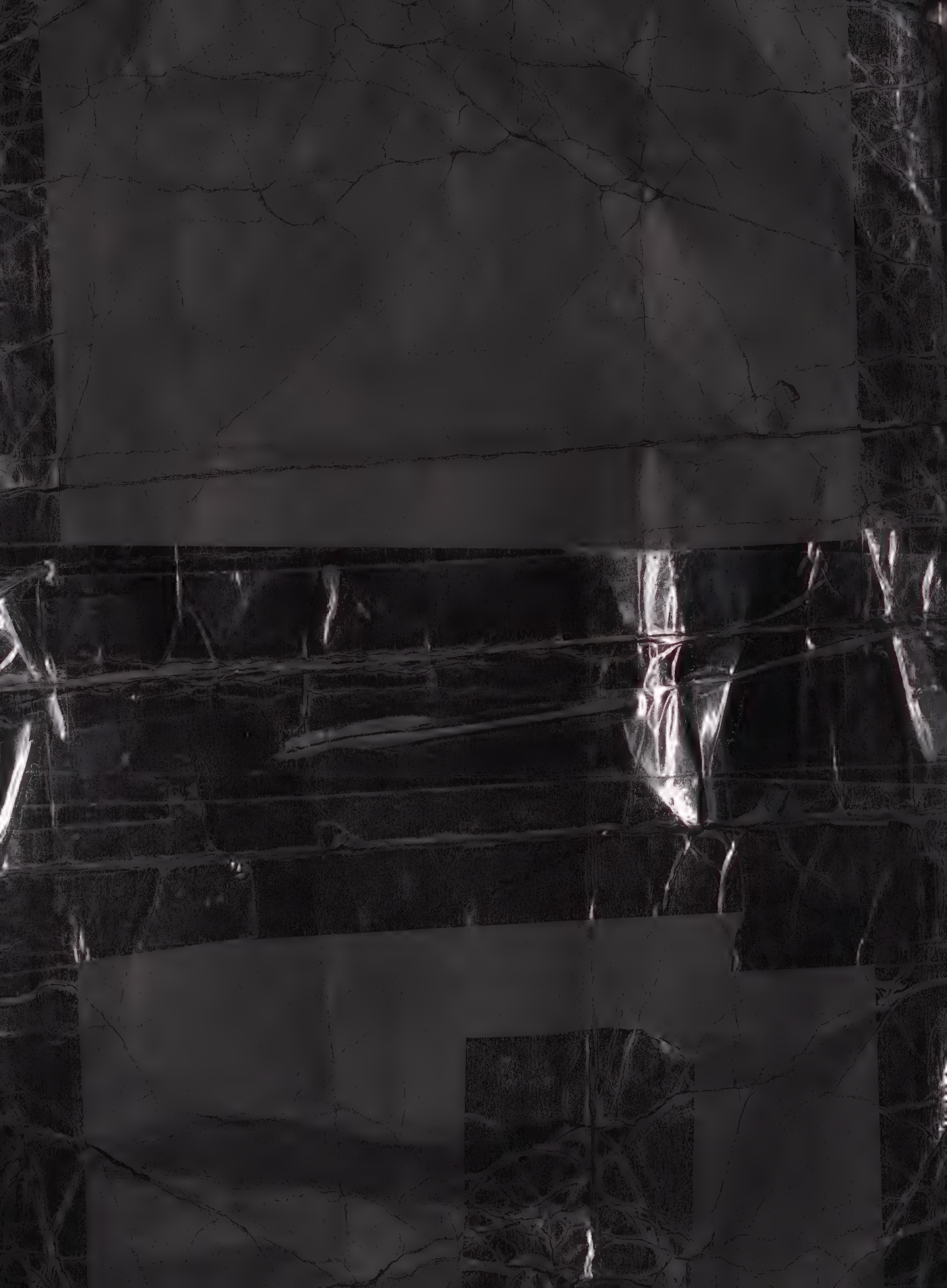





DETAIL A
CIRCUIT DETAIL (NOTE 2)
CLOCK OSCILLATOR
GENERATED 50 kHz CLOCK SIGNAL FOR ENCODER/DECODER U301
Y301 CONTROLS Q304 FREQUENCY.
FEEDBACK PATH FROM U301-4 VIA C322 AND Y301.
CODE PLUG DETERMINES CODE WORD THAT IS GENERATED AND DECODED
TRN6005A
CODE PLUG
J301
A+
PTT
SWA+
Z301
U301 CONTINUOUSLY GENERATES 23 BIT CODE WORD DURING TRANSMIT CYCLE WHEN XMIT CODE ENABLE IS HIGH. PROVIDES HIGH LEVEL AT AUDIO ENABLE OUTPUT WHEN PROPER CODE IS DETECTED DURING RECEIVE CYCLE.
C324 AND R331 HOLDS PIN 1 HIGH FOR APPROX. 100 MS AFTER POWER IS APPLIED.
+6.2V
+11.0V
Q316
M9653
Y301
R335
470K
C323
.0047
R334
15K
R331
100K
C324
DUMP
CODE SELECT
OSC IN
OSC OUT
CLOCK
U301
ENCODER-DECODER
(NOTE 5)
CODE OUT
R336
56K
R333
180K
R332
470K
DATA IN
SAMPLE PULSES
XMIT CODE ENABLE
AUDIO ENABLE
GOES HIGH WHEN VALID CODE IS DECODED
ENCODER-DECODER INPUT
6.2V DC
6V P-P
0V DC
SAMPLE PULSES
1.8 mS (TYP.)
6 V P-P
C325
.001
R314
27K
U303D
(NOTE 2)
10.3V
11.0V
10.5V
C344
220PF
C312
.001
U303-16
U303A
(NOTE 2)
U303B
(NOTE 2)
U303E
(NOTE 2)
R318
47K
R315
82.5K
R316
470K
10.0V FSQ
0.1V USQ
RCVR SQUELCHED = 0 V
RCVR UNSQUELCHED = 0.6 V
U303C
(NOTE 2)
R319
120K
CR303
R320
82K
R321
82K
C313
4.7
DELAYS U303C TURN-OFF ONE SEC. DURING FADE CONDITIONS.
CURRENT SOURCE
LOW DURING PTT
6.2V
PTT INVERTER
R330
27K
C315
10
Q309
M9643
R329
22K
R328
10K
CR305
GOES HIGH DURING PTT ENABLES U301 ENCODE FUNCTION
SW A
AUDIO ENABLE INVERTER
R323
120K
R324
82K


ATION OUTPUT (PTT OFF)
P-P
CODE WORD (PTT ON)
P-P
SW A+
OUTPUT AMPLIFIER
ENCODER LOW-PASS FILTER
REMOVES HIGH FREQUENCY COMPONENTS FROM TURNOFF CODE AND CODE WORD SIGNALS.
W A+
R337 100K
3.3V
CD
R338 120K
CODE DISABLE (NOTE 8)
R340
100K
C309 .043
R341
100K
C308 .036
C307 .0033
C332 .0056
5.2V
Q306 M9642
C331 .01
Q307 M9643
13.6V
12.2V
4.7V
3.5V
CALIBRATION OUTPUT (WITH U301-9 LOW)
61 V TYPICAL FOR 750 Hz DEVIATION (NOTE 6)
CODE WORD (WITH U301-9 HIGH)
R342 2K
CODE LEVEL SET (NOTE 6)
R352 22K
C306 15
4.2V
BRN-ORG
CODE OUTPU MODULATOR
C329 .0056
TO Q315 BASE
HIGH WHEN VALID CODE IS DETECTED, UNSQUELCHES RCVR AUDIO
RCVR SQUELCHED= 0.3V
RCVR SQUELCHED= 3.9V
GRY
SQUELCH CO TO PIN (G)
C314 .01
Q311 M9642 SQUELCH SWITCH
ORG-RED
MONITOR E (SEE CONNE
D
C

EEPS-23520-0



"DIGITAL PRIVATE-LINE" ENCODER/DECODER

MODEL TRN6906A

FUNCTION

Encodes and decodes "Digital Private-Line" codes. Encoder modulates transmitter. Decoder detects received tone and unsquelches receiver when proper code is received.

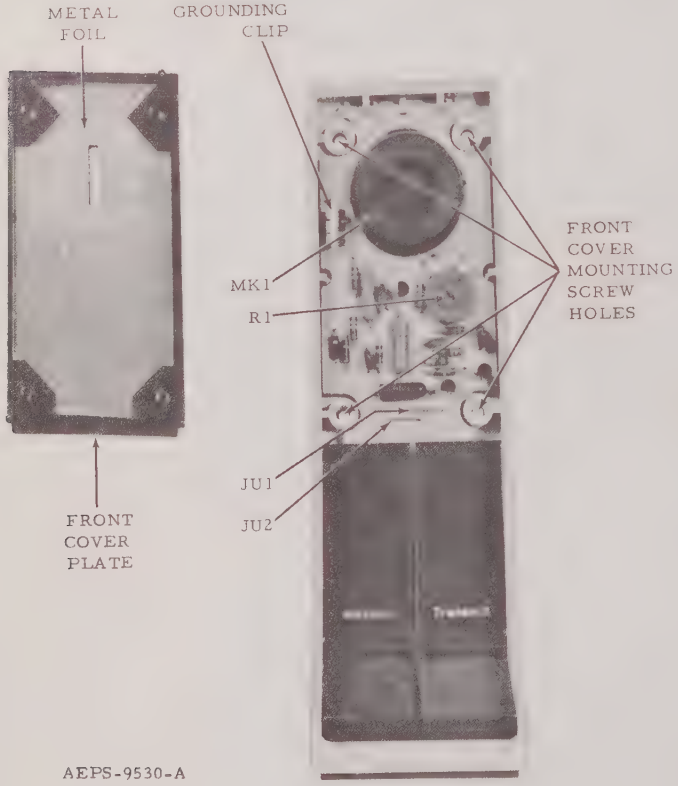
68P81034E53-O
(Sheet 2 of 2)
3/31/77-NPC

DESK MICROPHONES

MODELS TMN1008A-TMN1011A & TMN1018A

FUNCTION

The desk microphones provide a desk surface self-supporting stand to mount the PTT and PL monitor switches and to support the dynamic cartioid microphone element at mouth level. The TMN1008A and TMN1010A are used in "Private-Line" squelch systems and provide both PTT and monitor switches; the TMN1009A and TMN1011A are used with carrier squelch systems and use only the PTT switch. The TMN1018A is used in paging applications and includes both PTT and monitor switches.



AEPS-9530-A

REFERENCE SYMBOL	MOTO PART

PARTS LIST

TRN6029A & TLN492

C1	21-82
C2	8-829
C3	21-82
C4	23-84
C5	21-82
C6	8-829
C7	21-82
MK1	59-84
Q1	48-86
Q2, 3	48-86
R1	18-83
R2	6-129
R3	6-127
R4	6-124
R5	6-129
R7	6-129
R8	6-131
R9	6-129
R11	6-129
	NON
	5-843
	42-84

MICROPHONE DETAIL

ROLA T NO.	DESCRIPTION
	5A Microphone Circuit Board PL-3510-O
	CAPACITOR, fixed: uF ±10%
187B08	220 pF; 500 V
87E11	.022; 80 V
187B44	.001; 100 V
762H09	15; ±20%; 20 V
187B44	.001; 100 V
87E02	.047; 200 V
187B45	470 pF; 500 V
	CARTRIDGE, microphone:
640E01	miniature
	TRANSISTOR: (SEE NOTE)
9571	PNP; type M9571
9594	NPN; type M9594
	RESISTOR, fixed: ±10%; 1/4 W; unl. stated
083G34	variable; 1.5 meg ±30%
226	100k
305	15k
B14	470k ±5%
668	10k ±5%
707	2.7k ±5%
358	270k ±5%
231	3.3k
753	100
	-REFERENCED ITEMS
71E01	GROMMET, cartridge
724E01	CLIP, grounding

AEPS-9528-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

PARTS LIST

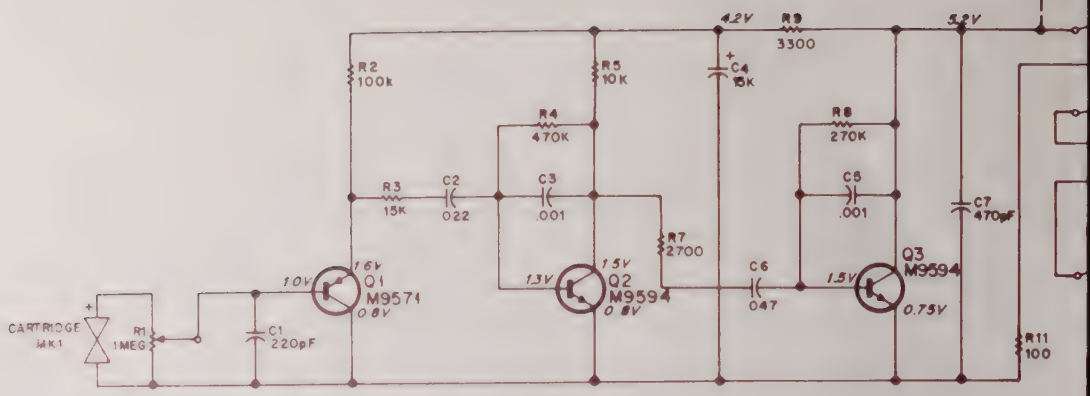
THN6254A (PL), & THN6255A (Carrier Squelch), THN6320A (Paging)
Microphone Housing & Hardware Kit PL-3573-1

S1, 2	40-84711E03	SWITCH, leaf: assembly: S1 has 1 form A, 1 form B and 1 form C; S2 ha 1 form A and 1 form B (THN6254A and THN6320A)
S1	40-84711E02	assembly: includes 1 form A and 1 form B (THN6255A)
		NON-REFERENCED ITEMS
	3-136676	SCREW, switch mtg. 4-40 x 1/4 pnl hex
	1-80779B59	CABLE ASSEMBLY includes: connector, 28-83372F02
	15-84186E01	COVER, front
	15-84188E01	COVER, rear
	15-84191E01	HOUSING
	26-84720E01	FOIL, grounding, front cover
	26-84721E01	FOIL, grounding, rear cover
	38-84184E02	BUTTON, left hand (THN6154
	38-84184E01	BUTTON, left hand (THN6155
	38-84192E01	BUTTON, right hand
	42-84725E01	CLIP, retainer
	47-84193E01	SHAFT
	47-84194E01	SHAFT EXTENSION
	47-84723E01	SHAFT COUPLING (THN6154 only)
	22-82591C05	PIN, roll (THN6154A only)
	64-84183E01	PLATE, base
	75-84722E01	PAD, base plate
	3-138809	BASE PLATE SCREW 4-40 x 5/16 phl bn hx bk ox
	3-138810	FRONT COVER SCREW 4-40 5/8 phl bn hx bk ox
	4-10058B10	WASHER ("TEFLON")

THN6252A (PL) & THN6253A (Carrier Squelch)
Microphone Housing & Hardware Kit PL-3511-

S1, 2	40-84711E03	SWITCH, leaf: assembly: S1 has 1 form A, 1 form B and 1 form C; S2 1 1 form A and 1 form B (THN6252A)
S1	40-84711E02	assembly: includes 1 form 1 form B and 1 form C (THN6253A)
		NON-REFERENCED ITEMS
	3-136676	SCREW, switch mtg. 4-40 1/4 pnl hex
	1-80780B29	CABLE ASSEMBLY include 39-10184A24 LUGS; 5 req'd
	15-84186E01	COVER, front
	15-84188E01	COVER, rear
	15-84191E01	HOUSING
	26-84720E01	FOIL, grounding, front cov
	26-84721E01	FOIL, grounding, rear cov
	38-84184E02	BUTTON, plain (THN6253A
	38-84184E01	BUTTON, "monitor" (THN62
	38-84192E01	BUTTON, transmit
	42-84725E01	CLIP, shaft retainer
	47-84193E01	SHAFT, pivot
	47-84194E01	SHAFT EXTENSION
	47-84723E01	SHAFT COUPLING (THN62 only)
	22-82591C05	PIN, roll (THN6252A only)
	64-84183E01	PLATE, base
	75-84722E01	PAD, base plate
	3-138809	BASE PLATE SCREW 4-40 x 5/16 phl bn hx bk ox
	3-138810	FRONT COVER SCREW 4-40 5/8 phl bn hx bk ox
	4-10058B10	WASHER ("TEFLON")

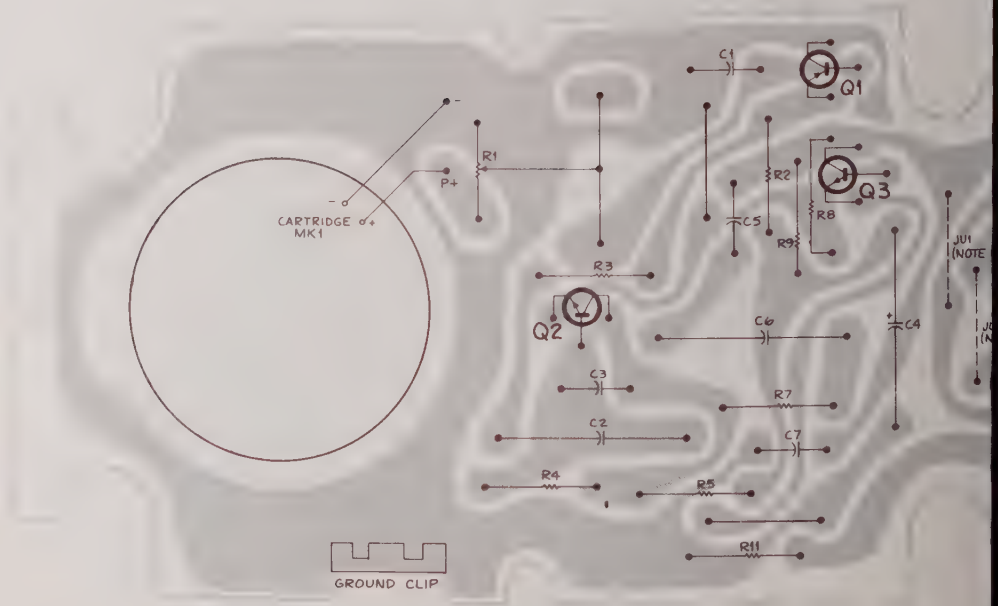
NOTE: Replacement transistors must be ordered by Motorola part number only for optimum performance.



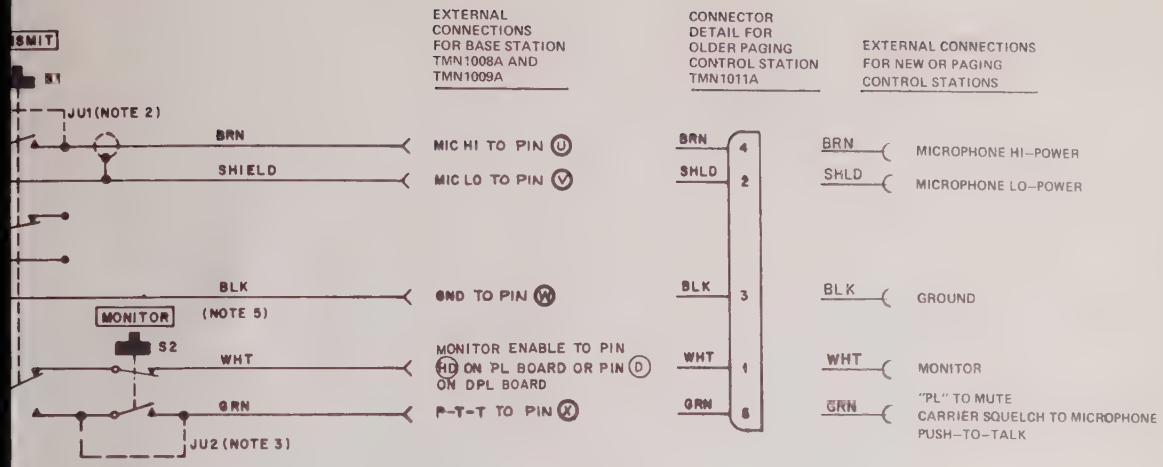
NOTES

1. UNLESS OTHERWISE STATED ALL CAPACITOR VALUES ARE IN MICROFARADS
2. REMOVE JU1 FOR PARALLEL MIC OPERATION
3. JU2 IS NORMALLY REMOVED TO ENSURE THAT THE OPERATION MONITOR THE CHANNEL (FCC REQUIREMENT). IN THIS CASE BOTH THE MONITOR AND TRANSMIT BUTTONS MUST BE PRESSED TO TRANSMIT. RELEASING EITHER SWITCH ENDS THE TRANSMISSION
4. ALL DC VOLTAGE READINGS ARE WITH RESPECT TO THE MIC LO LEAD
5. MONITOR SWITCH S2 IS PRESENT IN MODEL TMN1008A & TMN1010A ONLY

TMN1010A	TMN1011A
1	1
1	1



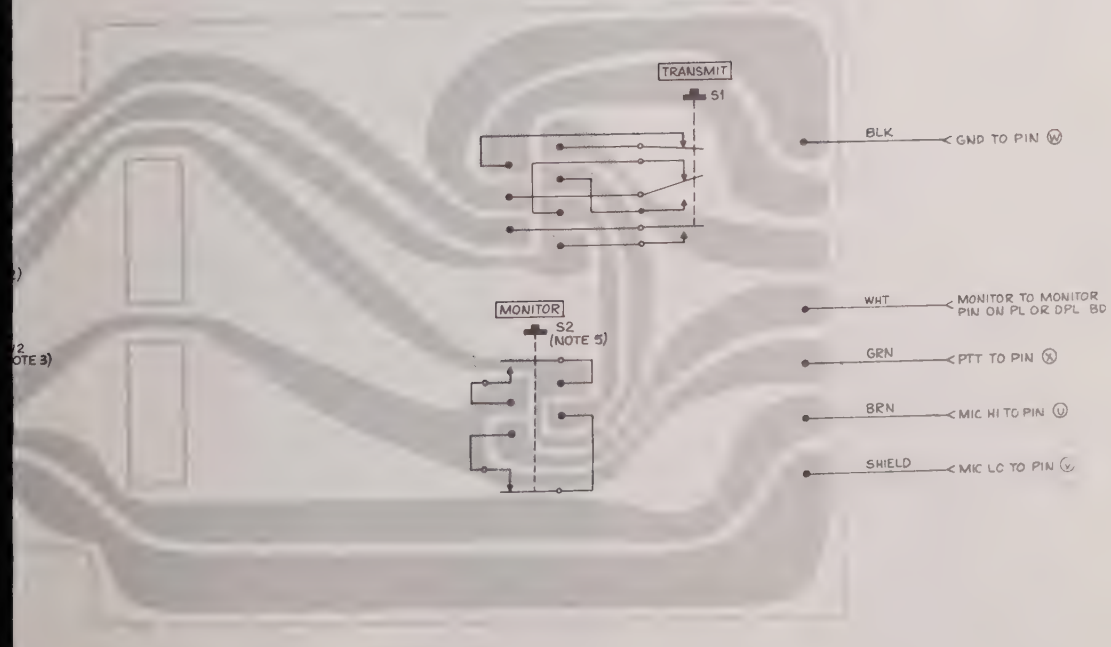
TRANSISTOR DETAIL



DEPS-17648-D

DESK MICROPHONE MODEL COMPLEMENT

	TMN1008A	TMN1009A	TMN1018A	DESCRIPTION	VERSION
		1		TLN4925A MICROPHONE CIRCUIT BOARD	2
	1		1	TRN6029A MICROPHONE CIRCUIT BOARD	0
	1			THN6252A MICROPHONE HOUSING AND HARDWARE KIT	0
		1		THN6253A MICROPHONE HOUSING AND HARDWARE KIT	0
				THN6254A MICROPHONE HOUSING AND HARDWARE KIT	0
				THN6255A MICROPHONE HOUSING AND HARDWARE KIT	0
			1	THN6320A MICROPHONE HOUSING AND HARDWARE KIT	0



VN FROM COMPONENT SIDE

OL-DEPS-17641-A

MOXY
Two-Way FM Radio
150.8-174 MHz

68P81034E55-O

MOTOROLA

MOXY

Two-Way FM Radio

150.8-174 MHz

Instruction Manual

68P81034E55-O

MOXY
TWO-WAY FM RADIO

150.8-174 MHz

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Schematic Diagram, Circuit Board Detail, and Parts List 68P81030E06

MOTOROLA INC.
Communications Division

service publications
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68P81034E55-O
3/30/77-NPC

SAFETY INFORMATION

The United States Department of Labor, through the provisions of the Occupational Safety and Health Act of 1970 (OSHA), has established an electromagnetic radiation safety standard which applies to any two-way mobile radio equipment. Normal use of this radio will result in exposures far below the OSHA limit. There are no reported incidents of physical damage resulting from the use of this type radio. However, the following precautions are recommended:

DO NOT operate the transmitter when someone outside the vehicle is within two feet of the mobile antenna.

DO NOT operate the transmitter near unshielded electrical blasting caps or in an explosive atmosphere.

FPS-18196-B

RADIO SET ACCESSORY TABLE

KIT NUMBER	DESCRIPTION
TMN6113A	HANDSET
TRN6319A	HANDSET HANG-UP BOX
TRN6912A	REVERSE ESCUTCHEON, 1-FREQ. RADIOS
TRN6913A	REVERSE ESCUTCHEON, 2-FREQ. RADIOS
TSN6025A	EXTERNAL SPEAKER
TRN6223A	BASE STATION MOUNTING TRAY WITHOUT MICROPHONE CLIP
TRN6318A	BASE STATION MOUNTING TRAY WITH MICROPHONE CLIP
TRN6524A	SECURITY MOUNTING HARDWARE
TRN6525A	RADIO-TO-TRUNNION QUICK MOUNTING SCREWS
TLN5992A	LOCKING TRUNNION

SPECIFICATIONS

GENERAL

MAXIMUM BATTERY DRAIN @ 13.8 V	*MODEL*	*TRANSMIT*	*RECEIVE*	*STANDBY (SQUELCHED)*
	10-WATT	3 A		
	20-WATT	5.5 A	1.0 A	0.3 A
FREQUENCY RANGE		150.8-174 MHz		
DIMENSIONS		2-1/4" H x 6-1/2" W x 8-1/2" D		
WEIGHT		1.4 kg (3.0 lbs.)		

TRANSMITTER

RF POWER OUTPUT	*10 WATTS*	*20 WATTS*
SPURIOUS & HARMONIC EMISSIONS	56 dB below carrier	60 dB below carrier
OUTPUT IMPEDANCE	50 ohms	
FREQUENCY STABILITY	± 0.0005%; -30 °C to + 60 °C (+ 25 °C reference)	
MODULATION	16F3	
AUDIO SENSITIVITY	160 mV ± 3 dB for 3.0 kHz deviation at 1000 Hz	
FM HUM & NOISE	-70 dB below ± 3.0 kHz deviation at 1000 Hz	
AUDIO RESPONSE	+ 1, -3 dB of 6 dB/octave pre-emphasis from 300 to 3000 Hz	
AUDIO DISTORTION	Less than 3%	

RECEIVER

CHANNEL SPACING	30 kHz
SELECTIVITY -EIA SINAD	-65 dB @ ± 30 kHz
EIA SINAD INTERMODULATION	-70 dB
EIA MODULATION ACCEPTANCE	± 7 kHz
SENSITIVITY	0.35 uV or less for 20 dB quieting. 0.3 uV or less for 12 dB sinad.
FREQUENCY STABILITY	± 0.0005%; -30 °C to + 60 °C (+ 25 °C reference)
SPURIOUS & IMAGE REJECTION	Greater than 70 dB
SQUELCH THRESHOLD SENSITIVITY	Less than 0.2 uV
AUDIO OUTPUT	3 watts, with less than 10% distortion
AUDIO RESPONSE	+ 2, -8 dB/octave de-emphasis from 300 to 3000 Hz

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

FCC TRANSMITTER LICENSE DESIGNATIONS

RF OUTPUT	SINGLE FREQUENCY	TWO FREQUENCY
10 Watts	CC3295	CC3296
20 Watts	CC3297	CC3298

FCC RECEIVER CERTIFICATION NUMBERS

SINGLE FREQUENCY: RC0160
TWO-FREQUENCY: RC0161

MOTOROLA

MODEL CHART

FOR

"MOXY"

FM TWO-WAY RADIO

150.8-174 MHz

10 W & 20 W RF POWER

+12 V MOBILE

117 V AC BASE STATION

CODE:

[X] = ONE ITEM SUPPLIED WITH EACH RADIO

[/] = ONE ITEM SUPPLIED WITH EACH RADIO, DEPENDENT UPON FREQUENCY

[2] = NUMBER INDICATES QUANTITY SUPPLIED WITH EACH RADIO

[*] = REFER TO UNIFIED CHASSIS MODEL BREAKDOWN CHART FOR LOWER LEVEL KITS

ITEM	DESCRIPTION	MODEL NUMBER	NUMBER OF OPERATING FREQUENCIES	SQUELCH TYPE	RF POWER
	MOBILE MODELS				
		D23GMA1000AK	1	CARRIER	10 W
		D23GMA1300AK	2	CARRIER	10 W
		D23GMA3000AK	1	"PRIVATE-LINE"	10 W
		D23GMA3300AK	2	"PRIVATE-LINE"	10 W
		D23GMA6000AK	1	"DIGITAL PRIVATE-LINE"	10 W
		D23GMA6300AK	2	"DIGITAL PRIVATE-LINE"	10 W
		D33GMA1000AK	1	CARRIER	20 W
		D33GMA1300AK	2	CARRIER	20 W
		D33GMA3000AK	1	"PRIVATE-LINE"	20 W
		D33GMA3300AK	2	"PRIVATE-LINE"	20 W
		D33GMA6000AK	1	"DIGITAL PRIVATE-LINE"	20 W
		D33GMA6300AK	2	"DIGITAL PRIVATE-LINE"	20 W
	BASE STATION MODELS				
		L33GMB1100AM	1	CARRIER	10 W
		L33GMB1300AM	2	CARRIER	10 W
		L33GMB3100AM	1	"PRIVATE-LINE"	10 W
		L33GMB3130AM	2	"PRIVATE-LINE"	10 W
		L33GMB6100AM	1	"DIGITAL PRIVATE-LINE"	10 W
		L33GMB6130AM	2	"DIGITAL PRIVATE-LINE"	10 W
		L43GMB1100AM	1	CARRIER	20 W
		L43GMB1130AM	2	CARRIER	20 W
		L43GMB3100AM	1	"PRIVATE-LINE"	20 W
		L43GMB3130AM	2	"PRIVATE-LINE"	20 W
		L43GMB6100AM	1	"DIGITAL PRIVATE-LINE"	20 W
		L43GMB6130AM	2	"DIGITAL PRIVATE-LINE"	20 W
*TUD2032AB	UNIFIED CHASSIS (150.8-162 MHz; 1-FREQ., 10 W)				
*TUD2032AH	UNIFIED CHASSIS (150.8-162 MHz; 2-FREQ., 10 W)				
*TUD2033AB	UNIFIED CHASSIS (162-174 MHz; 1-FREQ., 10 W)				
*TUD2033AH	UNIFIED CHASSIS (162-174 MHz; 2-FREQ., 10 W)				
*TUD2042AB	UNIFIED CHASSIS (150.8-162 MHz; 1-FREQ., 20 W)				
*TUD2042AH	UNIFIED CHASSIS (150.8-162 MHz; 2-FREQ., 20 W)				
*TUD2043AB	UNIFIED CHASSIS (162-174 MHz; 1-FREQ., 20 W)				
*TUD2043AH	UNIFIED CHASSIS (162-174 MHz; 2-FREQ., 20 W)				
TRN6904A	ENCODER/DECODER, "PRIVATE-LINE"				
TRN6906A	ENCODER/DECODER, "DIGITAL PRIVATE-LINE"				
TPN1136A	POWER SUPPLY, 110 V				
THN6321A	HOUSING				
TAD6112A	ANTENNA, ROOF TOP (144-152 MHz)				
TAD6113A	ANTENNA, ROOF TOP (152-162 MHz)				
TAD6114A	ANTENNA, ROOF TOP (162-174 MHz)				
TMN1008A	MICROPHONE, DESK; "PRIVATE-LINE"				
TMN1009A	MICROPHONE, DESK; CARRIER SQUELCH				
TMN6130A	MICROPHONE, MOBILE				
TKN6794A	POWER CABLE, 25 W				
TRN6223A	BASE TRAY				
KLN6209A	"VIBRASPONDER" RESONANT REED				
KXN6121AA	CRYSTAL, TRANSMITTER (150.8-174 MHz)				
KXN6122AA	CRYSTAL, RECEIVER (150.8-174 MHz)				
TRN6899A	HARDWARE, 1-FREQ., "PRIVATE-LINE"				
TRN6900A	HARDWARE, 2-FREQ., "PRIVATE-LINE"				
TRN6901A	HARDWARE, 2-FREQ., CARRIER SQUELCH				
TRN6005A	CODE PLUG				
TRN6902A	ESCUTCHEON, 1-FREQ.				
TRN6903A	ESCUTCHEON, 2-FREQ.				
TRN6905A	INSTALLATION KIT, MOBILE				

EPS-23186-O

MOTOROLA

UNIFIED CHASSIS

MODEL BREAKDOWN CHART

FOR

"MOXY"

FM TWO-WAY RADIO

CODE:

[X] = ONE ITEM SUPPLIED

MODEL NUMBER	DESCRIPTION	ITEM: TUD2032AB	TUD2032AH	TUD2033AB	TUD2033AH	TUD2042AB	TUD2042AH	TUD2043AB	TUD2043AH
	DESCRIPTION: UNIFIED CHASSIS (150.8-162 MHz; 1-FREQ., 10 W)								
	DESCRIPTION: UNIFIED CHASSIS (150.8-162 MHz; 2-FREQ., 10 W)								
	DESCRIPTION: UNIFIED CHASSIS (162-174 MHz; 1-FREQ., 10 W)								
	DESCRIPTION: UNIFIED CHASSIS (162-174 MHz; 2-FREQ., 10 W)								
	DESCRIPTION: UNIFIED CHASSIS (150.8-162 MHz; 1-FREQ., 20 W)								
	DESCRIPTION: UNIFIED CHASSIS (150.8-162 MHz; 2-FREQ., 20 W)								
	DESCRIPTION: UNIFIED CHASSIS (162-174 MHz; 1-FREQ., 20 W)								
	DESCRIPTION: UNIFIED CHASSIS (162-174 MHz; 2-FREQ., 20 W)								
TLD5692A	MAIN CIRCUIT BOARD (150.8-162 MHz; 1-FREQ., 10 W)	X							
TLD5693A	MAIN CIRCUIT BOARD (162-174 MHz; 1-FREQ., 10 W)			X					
TLD5702A	MAIN CIRCUIT BOARD (150.8-162 MHz; 2-FREQ., 10 W)		X						
TLD5703A	MAIN CIRCUIT BOARD (162-174 MHz; 2-FREQ., 10 W)				X				
TLD5712A	MAIN CIRCUIT BOARD (150.8-162 MHz; 1-FREQ., 20 W)					X			
TLD5713A	MAIN CIRCUIT BOARD (162-174 MHz; 1-FREQ., 20 W)						X		
TLD5722A	MAIN CIRCUIT BOARD (150.8-162 MHz; 2-FREQ., 20 W)							X	
TLD5723A	MAIN CIRCUIT BOARD (162-174 MHz; 2-FREQ., 20 W)								X
TRN6897A	HARDWARE KIT (10 W)	X	X	X	X				
TRN6898A	HARDWARE KIT (20 W)					X	X	X	X

EPS-23187-O

FOREWORD

1. SCOPE OF MANUAL

This manual is intended for use by experienced technicians familiar with similar types of equipment. It contains all service information required for the equipment described and is current as of the printing date. Changes which occur after the printing date are incorporated by Instruction Manual Revisions (SMR). These SMR's are added to the manuals as the engineering changes are incorporated into the equipment.

2. MODEL AND KIT IDENTIFICATION

Motorola equipments are specifically identified by an overall model number on the nameplate. In most cases, assemblies and kits which make up the equipment also have kit model numbers stamped on them. When a production or engineering change is incorporated, revision suffix numerals are added to the affected kit model number. For example, a TLN4448A becomes a TLN4448A-1 with the first revision, TLN4448A-2 with the second revision, etc.

As diagrams are updated, information about the change is incorporated into a revision column. This revision column appears in the manual next to the parts list or, in some cases, on the diagram. It lists the reference number, part number, and description of the parts removed or replaced when the suffix number changed. With this information, the technician can find the information for the current version, and any previous version, of the equipment covered by the manual.

3. SERVICE

Motorola's National Service Organization offers one of the finest nation-wide installation and maintenance programs available to communication equipment users. This organization includes approximately 800 authorized Motorola Service Stations (MSS) located throughout the United States, each manned by one or more trained, FCC licensed technicians.

These MSS's are independently owned and operated and were selected by Motorola to service its customers. Motorola maintenance is available on either a time and material basis or on a periodic fixed-fee type arrangement.

The administrative staff of this organization consists of national, area and district service managers and district representatives, all of whom are Motorola employees with the objective to improve the service to our customers.

Should you wish to purchase a service contract for your Motorola equipment, contact your Motorola Service Representative, or write to:

National Service Manager
Motorola Communications Division
1303 E. Algonquin Road
Schaumburg, Illinois 60196

4. REPLACEMENT PARTS ORDERING

Motorola maintains a number of parts offices strategically-located throughout the United States. These facilities are staffed to process parts orders, identify part numbers, and otherwise assist in the maintenance and repair of Motorola Communications Division products.

Orders for all parts *except* crystals, channel elements, and "Vibrasender" ® and "Vibrasponder" ® resonant reeds should be sent to the nearest area parts center. Orders for instruction manuals should also be sent to the area parts center.

When ordering replacement parts or equipment information, the complete identification number should be included. This applies to all components, kits, and chassis. If the component part number is not known, the order should include the number of the chassis or kit of which it is a part, and sufficient description of the desired component to identify it.

Orders for crystals, channel elements, active filters, code plugs, and reeds should be sent directly to the factory address listed on the following page. Crystal and channel element orders should specify the crystal or channel element type number, crystal and carrier frequency, and the chassis model number in which the part is used.

Orders for active filters, code plugs, "Vibrasender" and "Vibrasponder" resonant reeds should specify type number and frequency, and should identify the owner/operator of the communications system in which these items are to be used.

5. ADDRESSES

5.1 GENERAL OFFICES

MOTOROLA, INC.
Communications Group Parts Dept.
1313 E. Algonquin Rd.,
Schaumburg, Illinois 60196
Phone: 312-576-6521
Executive Offices: 1303 E. Algonquin Rd.,
Schaumburg, Illinois 60196

5.2 U.S. ORDERS

WESTERN AREA PARTS
1170 Chess Drive, Foster City,
San Mateo, California 94404
Phone: 415-349-3111
TWX: 910-375-3877

MIDWEST AREA PARTS
10 W. North Ave.,
Lombard, Ill. 60148
Phone: 312-620-3000
TWX: 910-693-1592

MID-ATLANTIC AREA PARTS
6701 Elkridge Landing Road,
Linthicum, Maryland 21090
Phone: 301-796-8600

EAST CENTRAL AREA PARTS
12995 Snow Road,
Parma, Ohio 44130
Phone: 216-267-2210
TWX: 810-421-8845

EASTERN AREA PARTS
85 Harristown Road,
Glen Rock, New Jersey 07452
Phone: 201-447-4000
TWX: 710-988-5602

PACIFIC SOUTHWESTERN AREA PARTS
2333 Utah Avenue,
El Segundo, California 90245
Phone: 213-644-1101
TWX: 910-348-6278

SOUTHWESTERN AREA PARTS
3320 Belt Line Road,
Dallas, Texas 75234
Phone: 214-241-2151
TWX: 910-860-5505

SOUTHEASTERN AREA PARTS
5096 Panola
Industrial Blvd.
Decatur, Georgia 30032
Phone: 504-981-9800
TWX: 810-751-8300

5.3 CANADIAN ORDERS

CANADIAN MOTOROLA ELECTRONICS COMPANY
Parts Department
3125 Steeles Avenue,
East Willowdale, Ontario
Phone: 516-499-1441
TWX: 610-492-2713
Telex: 02-29944LD

5.4 ALL COUNTRIES EXCEPT U.S. AND CANADA

MOTOROLA, INC. OR MOTOROLA AMERICAS, INC.
International Parts Dept.
1313 E. Algonquin Road
Schaumburg, Illinois 60196 U.S.A.
Phone: 312-576-6492
TWX: 910-693-1592 or 1599
Telex: 722443 or 722424
Cable: MOTOL

5.5 FACTORY ADDRESS FOR CRYSTAL, CHANNEL ELEMENT, ACTIVE FILTER, CODE PLUGS AND RESONANT REED ORDERS

AIR MAIL ORDERS
Motorola, Inc.
Component Products Sales & Service
P.O. Box 66191
O'Hare International Airport
Chicago, Ill. 60666

REGULAR MAIL ORDERS AND CORRESPONDENCE
Motorola, Inc.
Component Products Sales & Service
2553 N. Edgington Street
Franklin Park, Illinois 60131

OPERATOR'S INSTRUCTIONS

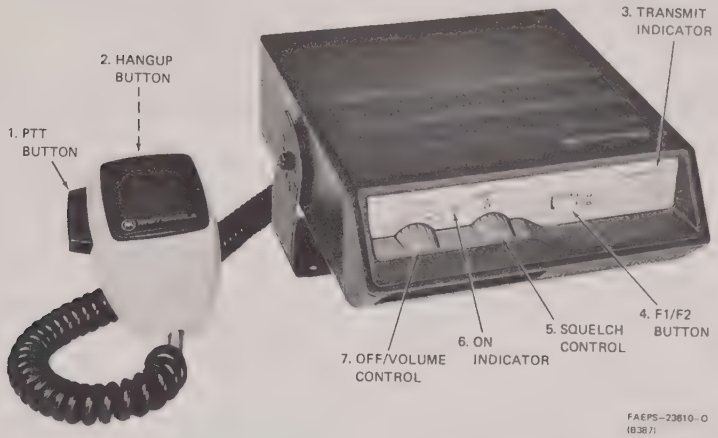


Figure 1. Operating Controls and Indicators

1. TO TURN ON RADIO

Refer to Figure 1. The on-off switch for the radio set is operated by the OFF-VOLUME control (7). To turn on the radio set, rotate the OFF-VOLUME control knob clockwise until a click is heard. The front panel lamp then turns on to illuminate the control labels and the green ON indicator (6).

2. TO RECEIVE

OPERATION	PROCEDURE
1. Disable PL (PL models only)	Remove microphone from hang-up clip.
2. Unsquelch radio	Turn SQUELCH control (5) counterclockwise until noise is heard.
3. Set VOLUME control	Adjust VOLUME control for a comfortable listening level.
4. Set SQUELCH control	Turn SQUELCH control clockwise until noise just stops.
5. Select operating frequency. (Two-frequency models only)	Press F1/F2 button (4), as needed.
The radio is now adjusted to receive *all* messages on the selected frequency.	
6. Enable PL (PL models only)	Return microphone to hang-up clip.
You are now able to hear messages for your system only.	

3. TO TRANSMIT

3.1 MOBILE STATION

IMPORTANT NOTE

When operating in extremely cold ambient conditions (-10 to -30°C), allow 2 minutes after radio is turned on before transmitting. This will ensure compliance with FCC rules and regulations.

OPERATION	PROCEDURE
1. Disable PL (PL models only)	Remove microphone from hang-up box.
2. Select operating frequency (Two-frequency models only)	Press F1/F2 button, as needed.
3. Listen	DO NOT TRANSMIT if anyone is using the channel.
4. Key transmitter	Press and hold down microphone PTT button (1). Red TRANSMIT light on radio front panel (3) will glow indicating that the transmitter is "on-the-air".
5. Transmit message	Hold microphone about 2 inches from your lips and speak slowly into microphone at a normal voice level. Shouting will not make your message easier to understand. Make each transmission as brief as possible.
6. Receive reply	Release microphone PTT button.
7. Enable PL at end of conversation (PL models only)	Return microphone to hang-up clip.

3.2 BASE STATION

OPERATION	PROCEDURE
1. Select operating frequency (two-frequency models only)	Press F1/F2 button, as needed.
2. Monitor the radio channel	Depress the microphone MONITOR switch.
3. Listen	Briefly listen for conversations on the radio channel.
4. Transmit the message	If the radio channel is not in use, depress and hold both the microphone MONITOR and TRANSMIT switches while speaking about 6 inches from the microphone. Speak distinctly and at a normal level. Release the TRANSMIT switch at the end of the message or to receive a reply.
5. Enable receiver muting (carrier squelch models)	At the end of the message or conversation release the microphone MONITOR switch.

NOTE
If JU2 is removed from the microphone (normal for paging base station to ensure that the operator monitors the channel) both the microphone transmit and monitor buttons must be pressed to transmit -- releasing either switch ends the transmission.

PREINSTALLATION INSTRUCTIONS

1. UNPACKING

When unpacking the radio from its shipping carton, refer to the model chart at the front of this manual. If any item is missing, contact your Motorola representative immediately.

2. LICENSING REQUIREMENTS

FCC Regulations state that a station license must be obtained for each radio installation (mobile or base) by the owner of the equipment. The station licensee is responsible for ensuring that the transmitter power, frequency, and deviation are within the limits permitted under the station license. Adjustments to the transmitter section of the radio may be made only by a technician possessing an FCC commercial operator's license. No license is required to install, check out, or operate the radio.

3. BENCH CHECK

3.1 INTRODUCTION

Each radio set is adjusted, tested, and inspected before shipment. However, it is recommended that both the transmitter and receiver sections of the radio be checked for proper operation just prior to installation.

3.2 TESTING

The radio should be tested with all cables and accessories supplied with the radio connected as they will be in the final installation. The frequency, deviation, and output power of the transmitter should be checked, as well as the sensitivity, squelch operation, and audio quality of the receiver. Radios with PL or DPL capabilities should be operated in that mode to verify proper encode/decode performance. Refer to the Specifications page at the front of this manual to determine whether the radio is operating properly. Improper operation can generally be corrected by touching up the receiver or transmitter alignment.

4. INSTALLATION PLANNING - MOBILE RADIOS

4.1 GENERAL

Planning is the key to fast, easy radio installation. Before a hole is drilled or a wire is run, inspect the vehicle and determine how and where you intend to mount the antenna, radio set, and accessories. Plan wire and cable runs to provide maximum protection from pinching, crushing, and overheating.

4.2 ANTENNA MOUNTING

The best mounting location for the antenna is in the center of a large, flat conductive surface. In almost all vehicles these requirements are best satisfied by mounting the antenna at the center of the roof. Some vehicles have a large trunk lid that will provide a good antenna location. If the trunk lid is used, connected grounding straps between the trunk lid and vehicle chassis to insure that the trunk lid is at chassis ground.

4.3 RADIO MOUNTING

4.3.1 General

The trunnion mount allows the radio set to be mounted to a variety of mounting surfaces. Be sure the mounting surface is able to adequately support the weight of the radio. Allow sufficient space around the radio for free air flow for cooling. Be sure the unit is close enough to the vehicle operator to permit easy access to the operating controls while he is driving.

4.3.2 Inverted Escutcheon Installation

A front panel escutcheon with inverted lettering (Motorola Option B96) is available if you plan to mount the radio above the operator's normal line of sight. Install the inverted escutcheon as follows:

Step 1. Remove the radio chassis from its housing.

Step 2. Using a long screwdriver, push on the back of the upright escutcheon until it is free of the radio housing front panel.

Step 3. Remove the tape from the back of the inverted escutcheon. Press the inverted escutcheon onto the radio housing front panel.

Step 4. Pull the pushbutton off the F1/F2 switch. Invert the pushbutton and replace it on the switch.

Step 5. Reinstall the radio chassis into the housing. Be sure the chassis locking tabs properly engage the slots in the housing.

4.4 DC POWER AND WIRING

4.4.1 This radio must be operated *only* in negative-ground electrical systems. Reverse polarity will

not damage the radio, but the cable fuse will blow. Check the vehicle ground polarity before you begin installation to prevent wasted time and effort.

4.4.2 Connect the red power lead through F601 to the vehicle battery positive terminal. Connecting the red lead to any other positive voltage point in the vehicle is *not recommended.*

CAUTION

If dc power is to be controlled by the vehicle ignition switch, a switching relay (Motorola Part No. 59-813674) should be used to switch the red power lead. The vehicle ignition switch, then, controls dc to the relay coil.

4.4.3 Connect the black power lead to a good ground point on the vehicle chassis. *Do not* connect the black lead directly to the battery negative terminal.

4.4.4 The wiring provided with the radio is of sufficient size to handle the maximum radio current demand. If wiring must be added to that provided, be sure the gauge of the added wire is sufficient for the current to be carried and length of the added run.

5. INSTALLATION PLANNING - BASE STATIONS

5.1 ANTENNA SYSTEM

Selecting the antenna system for your base radio depends on factors beyond the scope of this manual. Your Motorola representative can help you choose the antenna system that will best serve your particular needs.

5.2 RADIO LOCATION

Choose a location for your base radio as close as possible to where the antenna cable enters the building. Be sure 117 volt, 60 Hz power is available. Make sure sufficient air can flow around the radio to permit adequate cooling.

INSTALLATION INSTRUCTIONS

1. MOBILE RADIOS

Step 1. Mount the antenna, using the instructions provided with the antenna kit. Run the coaxial cable to the intended radio set mounting location. Cut off the excess cable and install the cable connector.

Step 2. Route power wiring, but do not make power connections and do not tie the wires down. Be sure to use grommets wherever the wiring must pass through a metal panel.

Step 3. Mount the radio set trunnion mounting bracket. See Figure 2.

Step 4. Mount the microphone hang-up clip. If mounting surface is not at chassis ground, use the black wire supplied with the radio to connect the hang-up clip to a convenient ground point.

Step 5. Connect the power plug and coaxial cable connector to the radio set. See Figure 3. Install the radio in the trunnion mounting bracket.

Step 6. Complete the power wire installation. Be sure to leave sufficient slack wire behind the radio set to make the unit easy to remove and reinstall. Strap the wire down where necessary being sure the wires do not make contact with hot areas on the engine. Be sure the wires cannot be snagged by the operator's feet or during normal vehicle operation. Cut off the excess power lead length and attach the terminal lugs supplied.

Step 7. If an external speaker is used, secure wiring to the speaker as needed. Allow sufficient slack in wiring for future maintenance.

Step 8. Connect the power leads. Be sure the connection points are clean and free of paint, dirt, and corrosion.

Step 9. Test radio and its accessories for proper system operation. Check the antenna SWR, using an in-line wattmeter.

CAUTION

After installation, remove the protective film from the escutcheon. To remove any dust accumulation from the escutcheon, always wipe with a damp cloth.

2. BASE STATIONS

Step 1. Mount the radio set to the base mounting tray.

Step 2. Prepare radio set power leads as follows: Attach the provided pins to the ends of the red and black power leads. Insert power leads into the mating plug of the base station power supply output jack; red lead pin into position 4 and the black lead pin into position 1. (See Fixed Station Power Supply section of this manual.)

Step 3. Connect an in-line wattmeter between the radio antenna connector and the antenna system.

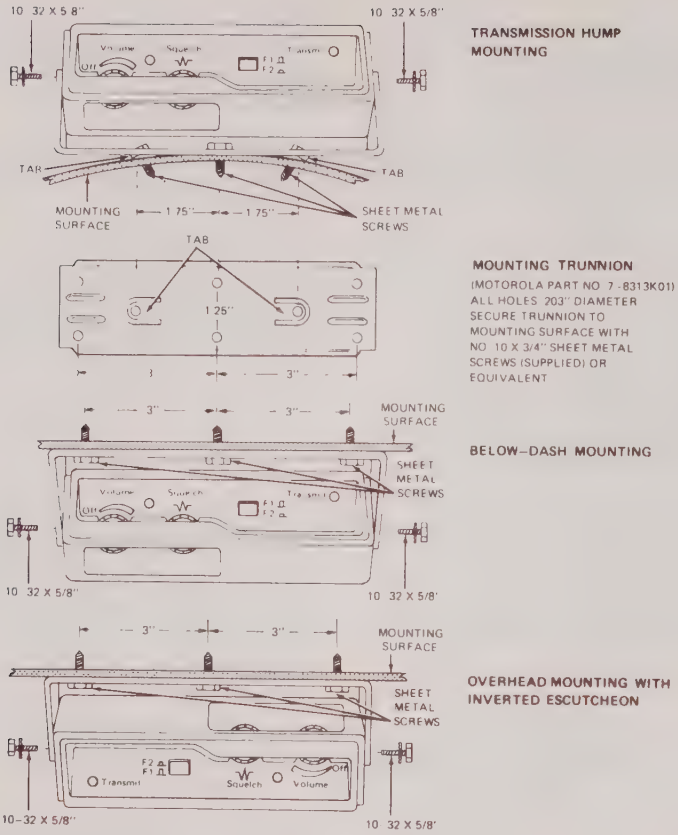


Figure 2. Radio Mounting Detail

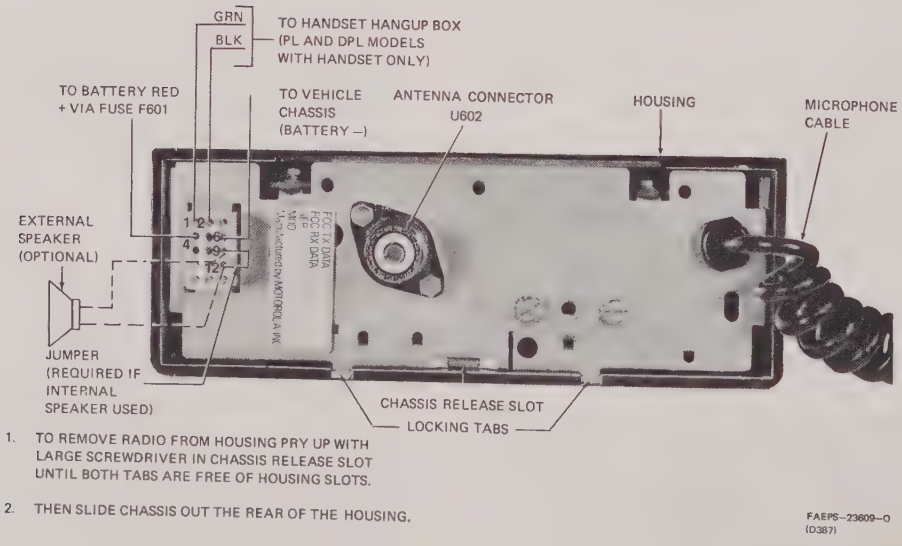


Figure 3. Connections to Radio Set Rear Panel

Step 4. Plug the base dc power supply into the 117 volt, 60 Hz outlet. Set the AC POWER switch on the power supply to the ON position.

Step 5. Key the transmitter and check the antenna system VSWR. If the VSWR is 3:1 or lower, disconnect the wattmeter and connect the antenna coaxial cable to the radio set antenna jack.

Step 6. Test the radio set and accessories for proper operation. A brief conversation with a mobile unit in your system will indicate whether the base station is operating satisfactorily.

CAUTION

After installation, remove the protective film from the escutcheon. To remove any dust accumulation from the escutcheon, always wipe with a damp cloth.

SERVICE

1. INTRODUCTION

This radio is designed for easy servicing. Numerous test points are provided on the radio circuit board. For servicing information, refer to the schematic diagrams, circuit board details, and alignment procedures in this manual. Theory of operation is shown on the schematic diagrams.

2. HOUSING REMOVAL

(Refer to Figure 3)

Step 1. Remove the screws that hold the radio set in the trunnion mount.

Step 2. Insert a screwdriver blade into the screwdriver slot near the bottom of the radio chassis rear panel.

Step 3. Push the screwdriver against the housing until the chassis locking tabs clear the slots in the radio housing.

Step 4. Slide the radio chassis out the back of the housing.

3. POWER PLUG WIRE REPLACEMENT

A special wire extraction tool (Motorola model number ST1145) is available to remove wires from power plug P601. The tool must be used for ease of wire extraction and to prevent damage to the connector or its pins.

HANDLING PRECAUTIONS FOR CMOS INTEGRATED CIRCUITS

Many of the integrated circuit devices used in communications equipment are of the CMOS (Complementary Metal Oxide Semiconductor) type. Because of their high open circuit impedance, CMOS ICs are vulnerable to damage from static charges. Care must be taken in handling, shipping, and servicing them and the assemblies in which they are used.

Even though protection devices are provided in CMOS IC inputs, the protection is effective only against overvoltage in the hundreds of volts range such as are encountered in an operating system. In a system, circuit elements distribute static charges and load the CMOS circuits, decreasing the chance of damage. However, CMOS circuits can be damaged by improper handling of the modules even in a system.

To avoid damage to circuits, observe the following handling, shipping, and servicing precautions:

(1) Prior to and while servicing a circuit module, particularly after moving within the service area, momentarily touch both hands to a bare metal earth grounded surface. This will discharge any static charge which may have accumulated on the person doing the servicing.

(2) Whenever possible avoid touching any electrically conductive parts of the circuit module with your hands.

(3) Normally, circuit modules can be inserted or removed with power applied to the unit. However, check the INSTALLATION and MAINTENANCE sections of the manual as well as the module schematic diagram to insure there are no objections to this practice.

(4) When servicing a circuit module, avoid carpeted areas, dry environments, and certain types of clothing (silk, nylon, etc.) because they contribute to static buildup.

(5) All electrically powered test equipment should be grounded. Apply the ground lead from the test equipment to the circuit module before connecting the test probe. Similarly, disconnect the test probe prior to removing the ground lead.

(6) If a circuit module is removed from the system, it is desirable to lay it on a conductive surface (such as a sheet of aluminum foil) which is connected to ground through a resistance of approximately 100k.

WARNING

If the aluminum foil is connected directly to ground, be cautious of possible electrical shock from contacting the foil at the same time as other electrical circuits.

(7) When soldering, be sure the soldering iron is grounded.

(8) Prior to connecting jumpers, replacing circuit components, or touching CMOS pins (if this becomes necessary in the replacement of an integrated circuit device), be sure to discharge any static buildup as described in procedure 1. Since voltage differences can exist across the human body, it is recommended that only one hand be used if it is necessary to touch pins on the CMOS device and associated board wiring.

(9) When replacing a CMOS integrated circuit device, leave the device in its metal rail container or conductive foam until it is to be inserted into the printed circuit module.

(10) All low impedance test equipment (such as pulse generators, etc.) should be connected to CMOS device inputs after power is applied to the CMOS circuitry. Similarly, such low impedance equipment should be disconnected before power is turned off.

(11) Replacement modules shipped separately from the factory will be packaged in a conductive material. Any modules being transported from one area to another should be wrapped in a similar material (aluminum foil may be used). NEVER USE NONCONDUCTIVE MATERIAL for packaging these modules.

REQUIRED TEST EQUIPMENT FOR "MOXY" RADIO SERVI

GENERAL TYPE	APPLICATION	RECOMMENDED MODEL	M
DC Voltmeter	DC voltage measurements, general	Motorola T1009A	Meası Sensit
VTVM or DVM	DC voltage readings requiring a high input resistance meter	Motorola S1063A	Meası Input
AC Voltmeter	Audio voltage measurements	Motorola S1053C	Meası Input
RF Voltmeter	RF voltage measurements	Motorola S1339A	Meası from Input pedan
Oscilloscope	Waveform observation	Telequipment Model D61	Vertic 10 V/ Horiz -1 sec.
RF Wattmeter	Transmitter output power measurement	Motorola Wattmeter with appropriate element and T1013A RF Dummy Load	Meası from
Frequency Meter	Transmitter frequency measurement	Motorola S-1327 Series, S-1343 Series, or S-1344 Series	Meası 200 M Frequ
Deviation Meter	Transmitter modulation deviation measurement	Motorola S1323A or Motorola S1325A	Meası deviat Frequ
RF Signal Generator	Receiver alignment and troubleshooting	Motorola S1318A	Frequ Outpı 100,0 Must ± 3 kl modu
Audio Signal Generator	Audio circuit troubleshooting	Motorola S1067A	Frequ Outpı
PL Tone Generator	"Private-Line" Decoder troubleshooting	Motorola SLN6221A	Frequ Outpı
DPL Test Set	"Digital Private-Line" Encoder-Decoder Troubleshooting	Motorola SLN6413A	

CING

IN. SPECIFICATIONS

ırement range: 0-15 V dc
ivity: 20,000 ohms/volt

ırement range: 0-15 V dc
resistance: 11 megohms

ırement range: 0-10 V ac
resistance: 10 megohms

ırement range: 100 uV-3 V
l MHz-200 MHz
s: 50 ohm and high im-
ce

al sensitivity: 10 mV-
division
ontal time base: 1 usec.
/division

ırement ranges: 0-25 Watts
100-250 MHz

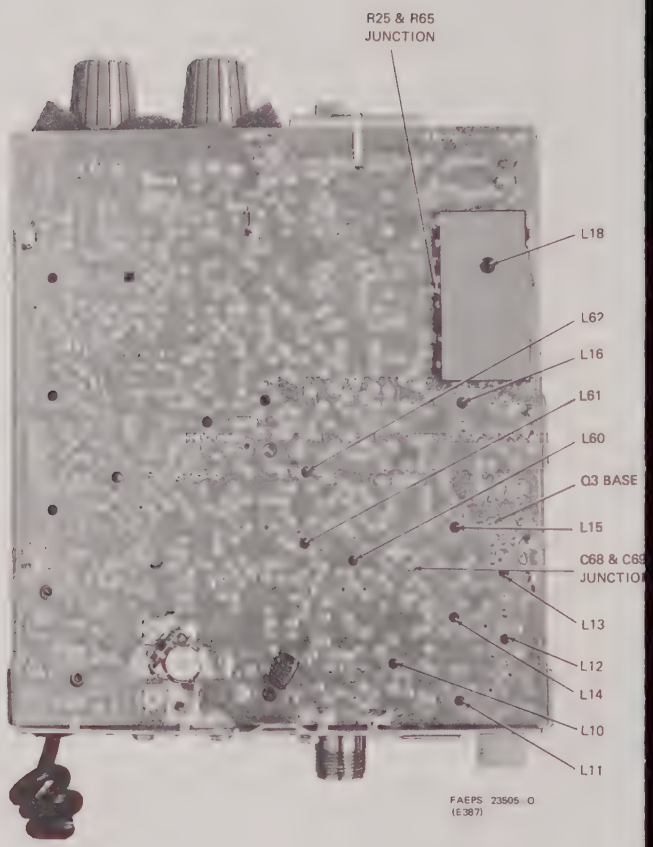
ırement range: 100-
Hz
ency resolution: 10 Hz

ırement range: 0-10 kHz
ion
ency Range: 100-200 MHz

ency Range: 130-175 MHz
ıt Level: 0.1 uV-
)0 uV
be capable of at least
Hz deviation when
lated by 1 kHz tone.

ency Range: 20 Hz-20 kHz
ıt Level: 50 mV-1 V

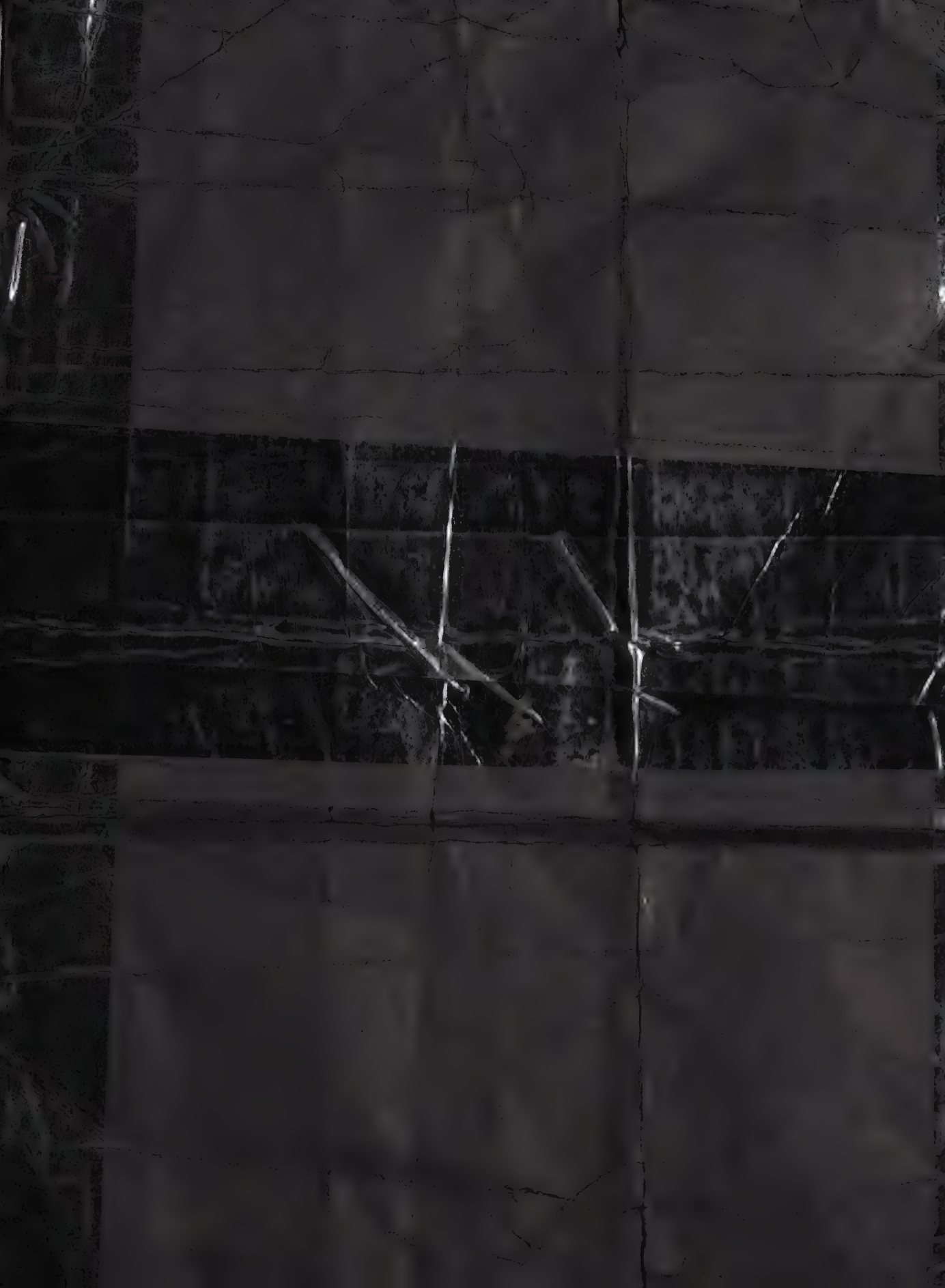
ency Range: 50 Hz-200 Hz
ıt Level: 0-500 mV



Receiver Adjustment Locations

RECEIVER METERING WITH 20,000 OHM/VOLT VOLTM

METERING POINT	VOLTMETER LEAD CONNECTIONS		VOLTMETER SCALE	TYPICAL
	+	—		
TP1 2nd IF Ampl. Signal Level	TP1	Chassis Ground	2.5 V DC	.25-.5 V (1.75 V (4
TP2 Quadrature Detector Output	TP2	Chassis Ground	10 V DC	5.8 V



PREALIGNMENT NOTES

1. On "Digital Private-Line" and "Private-Line" radio sets disable the DPL or P microphone hang-up button.

2. In some cases, peak meter readings may occur at two points in the tuning range where the slug is nearest the top of the coil form (away from the circuit board).

3. Unnecessary tuning adjustments should be avoided. Usually, the receiver will re ment. Complete receiver alignment is necessary in the following cases:

   a. After changing the receiver operating frequency.

   b. After replacing a component in a frequency-sensitive network.

4. Before beginning a complete receiver alignment, preset tuning adjustments as follo

   a. Set L10, 11, 12 and 13 according to the graph shown below.

   b. Set L14, 15 and 16 slugs 7-1/2 turns from tops of coil forms.

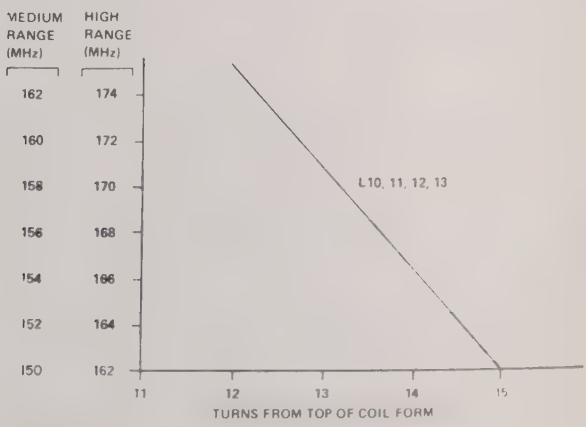
   c. Set L18 slug 5 turns from top of coil form.

5. Receiver frequency calculations:

$$f_{osc} = \frac{f_c - 10.7\ MHz}{3} \qquad \text{and } f_{inj} = 3f_{osc} = f_c - 10.7\ MHz$$

   Where f_c = carrier frequency, f_{osc} = oscillator crystal frequency, and f_{inj} = m

6. On two-frequency radios, the receiver should be tuned on the higher operating fre



AEPS-23728-O

ETER

READINGS

No Signal)
0 uV Input)

± .2 V

TEST EQUIPMENT SET-UP

1. Metering may be accomplished with a 20,000 ohm-per-volt voltmeter. Refer to t this page.

2. Connect a dc power supply to the power leads of the test cable. Set the power supp

L decoder by ungrounding the

of a coil. Always use the peak

quire only a "touch-up" align-

ws:

xer injection frequency.

uency.

he voltmeter metering table on

y output to 13.8 volts.

STEP	INPUT SIGNAL	S
1 Quadrature Detector	10.7 MHz @ 1 mV	Near to "s
2 IF Strip	10.7 MHz (Note 1)	Ante
3 Injection Oscillator Frequency	— —	
	Carrier frequency	Ante
	10.7 MHz	Loos ampl
4 RF Amplifier and IF Strip	Carrier frequency (Notes 1 and 2)	Ante
5 Mixer Input and Injection Oscillator Output	Carrier frequency. Level set to where receiver begins to quiet.	Ante

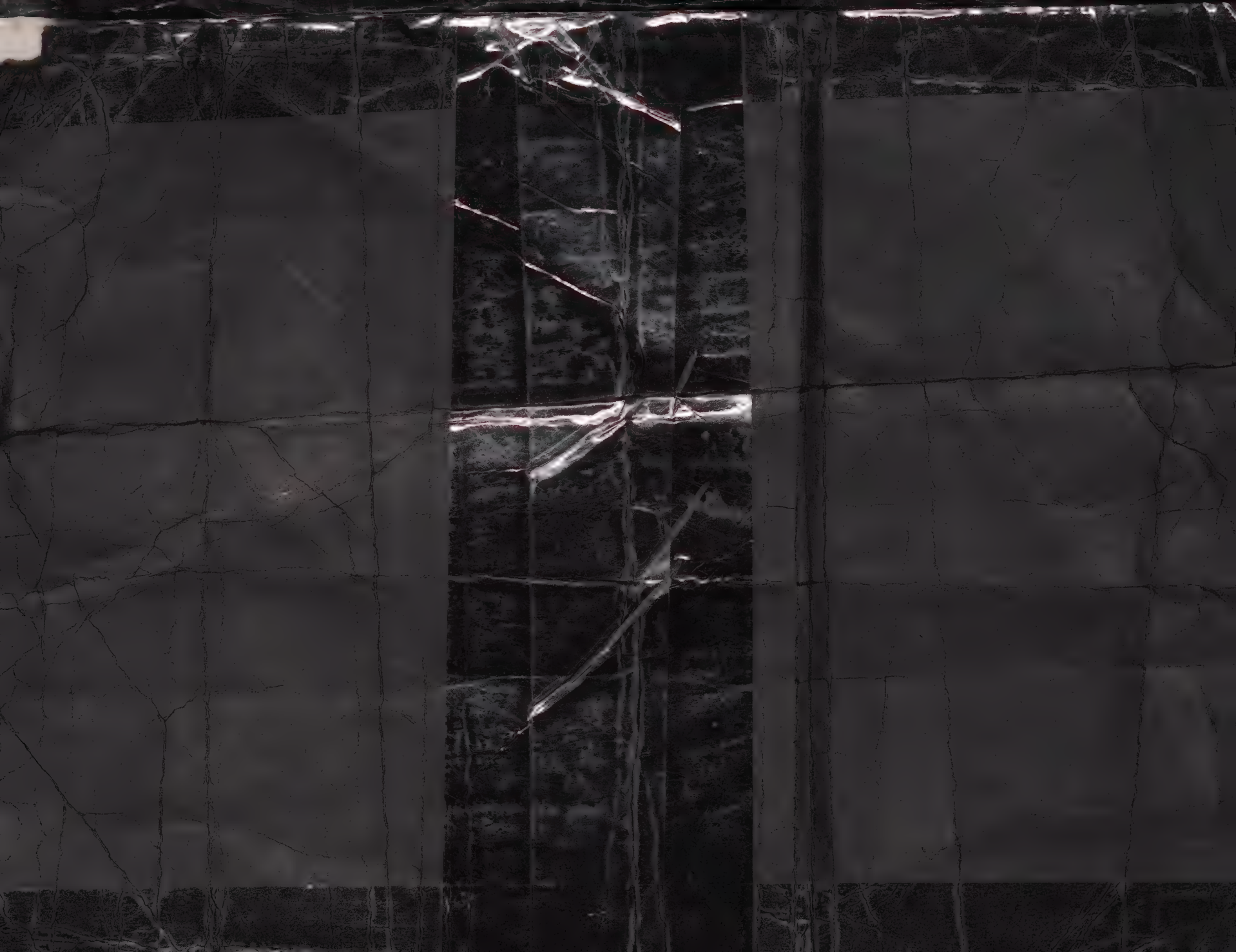
NOTES:
1. Reduce signal generator output as needed
2. To set signal generator approximately on signal generator frequency until receiver reading at junction of R25 & R65.

20 dB QU

1. Connect an ac vtvm across the speaker.
2. On PL or DPL model radio sets, disable P
3. Turn the SQUELCH control fully counter
4. Turn on the radio set and adjust the VOL
5. Connect an rf signal generator to the radio the generator output level control to mini
6. Slowly increase the output level of the rf s
7. Note the signal generator output signal lev

R

On two frequency radios, first tune up rece quieting by retuning L12.



RECEIVER ALIGNMENT PROCEDURE AND TEST EQUIPMENT LIST

RECEIVER ALIGNMENT

GNAL INPUT POINT	ADJUST	METERING POINT	DESIRED READING
Q3. Allow signal ɔray" into circuit.	L18	VOM or VTVM at TP2	5.8 V dc
nna Connector	L14, 15, 16	TP1 (VOM 20k/volt)	Peak, then repeak.
— —	L61 (F1), then L62 (F2)	Frequency counter through .01 uF capacitor to C68-C69 junction.	3 x crystal frequency. Recheck both coil settings.
	OR		
nna connector ely coupled to rf ffier	L61 (F1) and L62 (F2)	Radio speaker	Signal levels to provide beat note, then L61 (and L62 in 2-freq. models) for zero beat. Recheck both coil settings.
nna Connector	L13, 12, 11, 10, 60 then L14, 15, 16	TP1	Peak, then repeak.
nna Connector	L60, 13, 12, 11, 10	— —	Best Receiver quieting. Recheck injection oscillator frequency and readjust if necessary.

o keep TP1 reading below 1.75 V.

frequency without a frequency counter, open receiver squelch and adjust the quiets. Carefully adjust signal generator frequency for a 6.0 volt dc vtvm

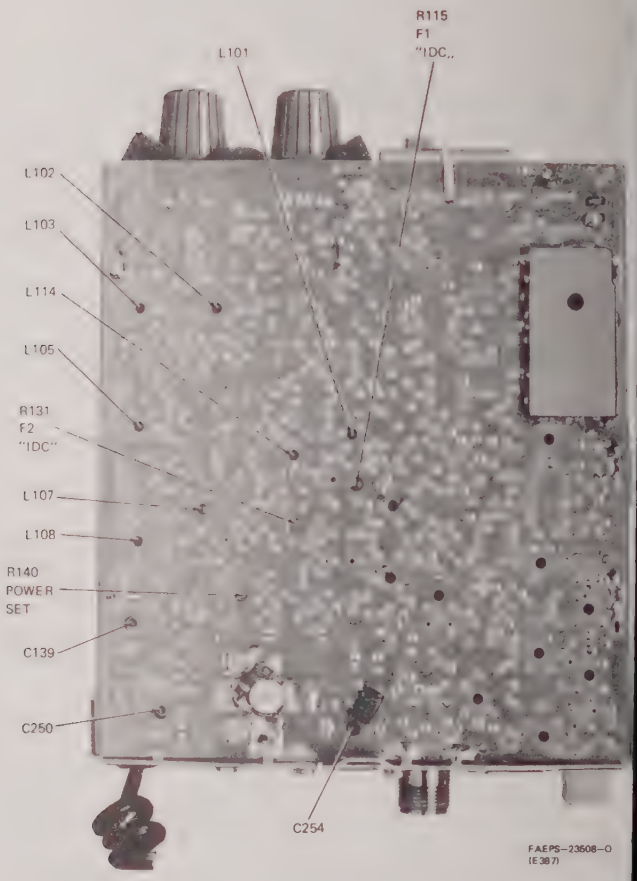
IETING SENSITIVITY MEASUREMENT

L by ungrounding the microphone hang-up button.
clockwise.
UME control until a reading of 2 volts is obtained on the ac vtvm.
set antenna connector. Set the signal generator to the carrier frequency, and set num.
gnal generator until the ac vtvm reads 0.2 volts.
el. This signal level is the 20 dB quieting sensitivity of the receiver.

CEIVER WIDE-SPACE TUNING

ver at higher frequency. Then switch to lower frequency and balance 20 dB

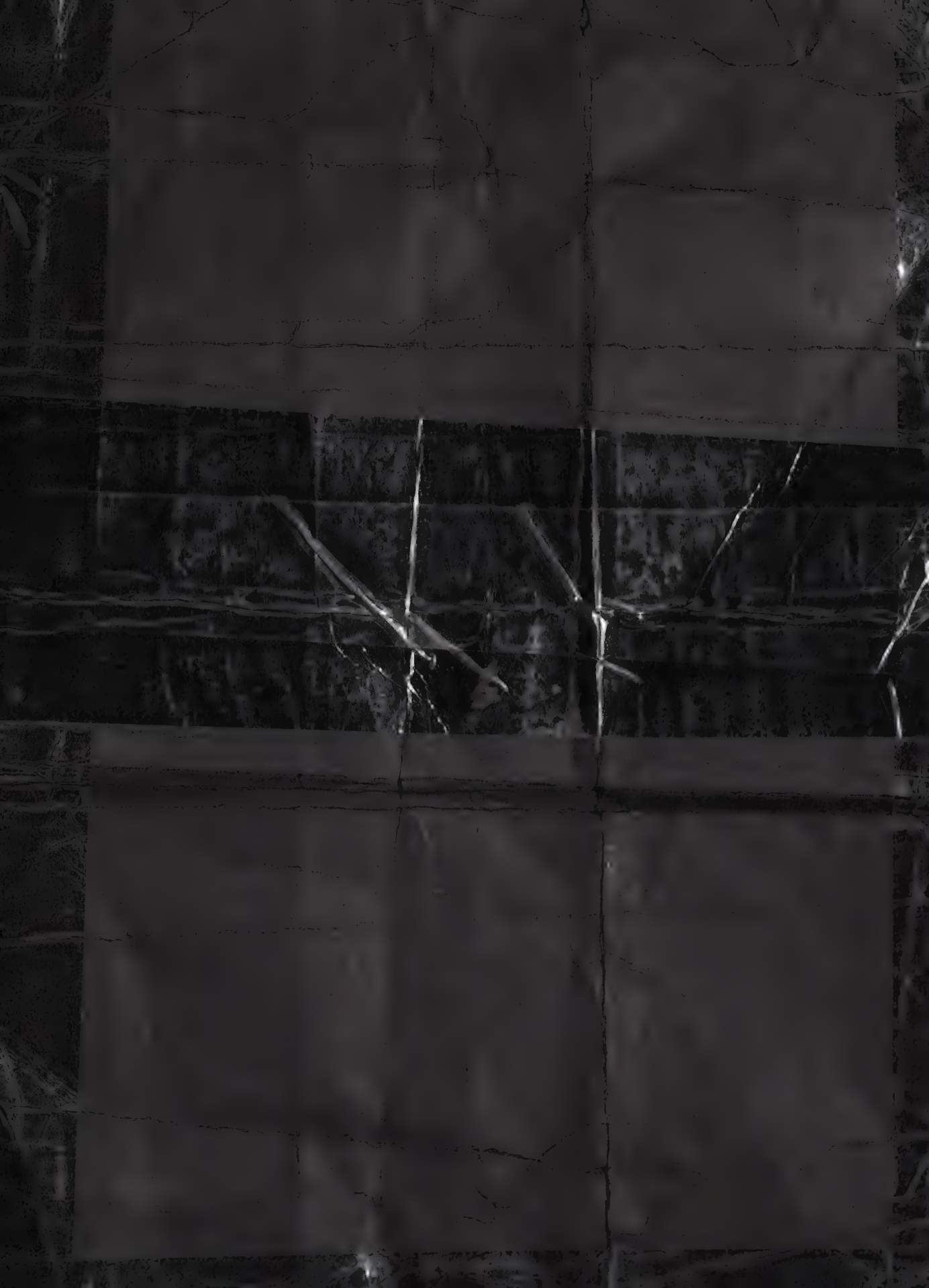
TRANSMITTER ALIGNMENT PROCEDURE



Transmitter Adjustment Locations

TRANSMITTER METER READINGS, USING 20,000 OHM/VOLT

METERING FUNCTION	VOLTMETER LEAD CONNECTIONS		VOLTMETER SCA
	+	—	
Buffer Ampl. Input	TP3	Chassis Ground	50 uA, DC
Exciter Output Amplifier Collector Current	SW A +	TP5	1 mA, DC
PA Current	SW A +	TP7	500 mA, DC



PREALIGNMENT NOTES

1. In some cases, peak readings may occ
   slug is nearest top of coil form (away fr

2. Unnecessary tuning adjustments shoul
   Complete transmitter alignment is nee

   a. After changing transmitter operati

   b. After replacing a component in a f

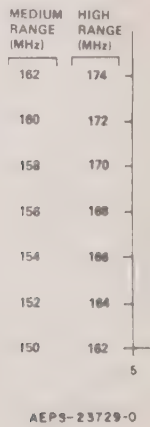
3. Before beginning a complete alignmen

   a. Set C139, and C250 and C254 1/4

   b. Set L101 (and L114 in 2-frequency

      Low or no meter 3 reading

   c. Set L102, L103, L105, L107, and L



AEPS-23729-0

VOLTMETER

LE	TYPICAL READINGS
	6 uA (Min.)
	.17 mA (Typ.) .22 mA (Max.)
	175 mA (Typ.) 250 mA (Max.)

   d. Set power set control R140 fully
      power output.

4. Key transmitter for each step in alignn
   an unaligned transmitter for prolonge

5. On two-frequency radios, the transmit

6. Transmitter frequency calculations:

   $f_c = 9f_{osc}$, where f_c = carrier freque

TEST EQUIPMENT SET-UP

1. Metering may be accomplished with a

2. Connect an rf wattmeter, terminated i
   connector J602.

3. Connect a dc power supply to the powe

TRANSMITTER

ır at two points in the tuning range of a coil. Always use the peak where
om circuit board).

l be avoided. Usually, only a "touch-up" transmitter alignment is needed.
ed in the following cases:

ıg frequency.

:equency-sensitive network.

, preset tuning adjustments as follows:

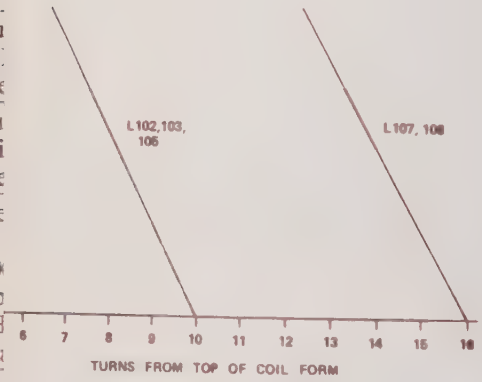
urn counterclockwise from tight.

models) 7 turns down from the top of coil form.

CAUTION

will be obtained if L101 and L114 are not properly preset.

108 according to the following chart:



counterclockwise (viewed from solder side of board) for maximum xmtr

ent procedure and de-key after alignment step is completed. Avoid keying
periods.

er should be aligned on the lower operating frequency.

ıcy, and f_{osc} = crystal oscillator frequency.

0,000 ohm-per-volt voltmeter.

ı a resonant antenna or 50-ohm resistive dummy load, to radio set antenna

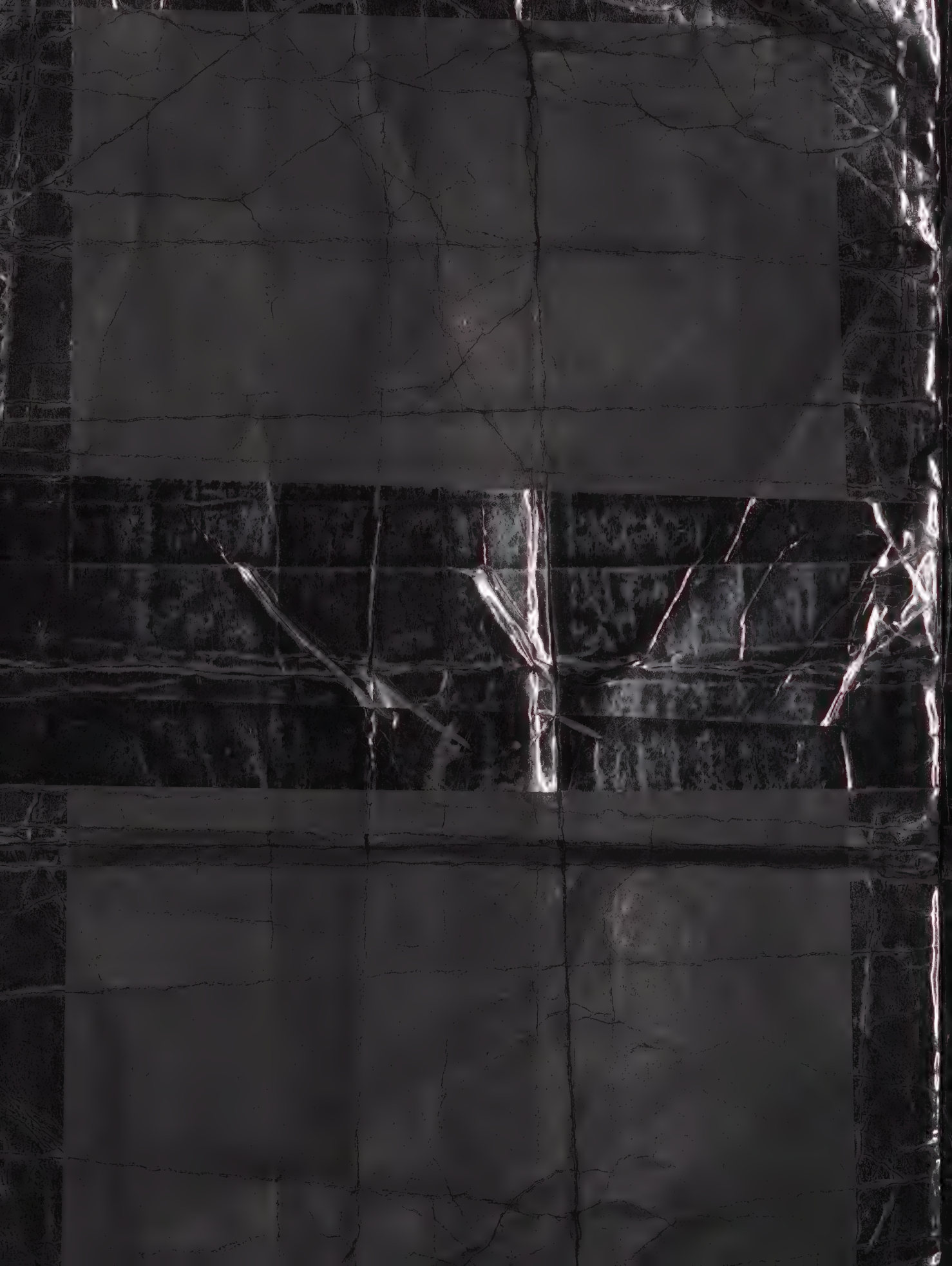
r leads of the test cable. Set the power supply output to 13.8 volts.

STEP
1 Oscillator Output
2 Buffer Output
3 Tripler Output
4 Exciter Output

STEP
1 PA Input
2 PA Output
3 Tripler
4 PA Output
5 Drive Regulator

On two-frequency r
up exciter and powe
maximum power ou

STEP
1 Oscillator
2 Tripler
3 Power Set
4 Oscillator Output



O-FREQUENCY RADIOS SHOULD BE TUNED ON LOWER FREQUENCY.

EXCITER ALIGNMENT

ADJUST	METERING POINT	DESIRED READING
L102, then L103	TP3	Peak
L105	TP3	Dip if no reading at TP5.
	TP5	Peak
L107, then L108	TP5	Peak
C139	TP7	Peak

10 & 20 WATT POWER AMPLIFIER ALIGNMENT

ADJUST	METERING POINT	DESIRED READING
C250	RF Output	Peak wattmeter reading
C254	RF Output	Peak wattmeter reading
Repeak L107, then L108	RF Output or TP5	Peak wattmeter reading or peak TP5 reading
C139, then C250, then C254	RF Output	Peak wattmeter reading
R140 Power Set	RF Output and TP7	12 W-10 W models, 21 W-20 W models, with TP7 less than 250 mA (SEE NOTE)

WIDE SPACE TUNE UP PROCEDURE

adios with the total channel separation in excess of 300 kHz but not exceeding 2 MHz, first tune- r amplifier on the lowest frequency as described above, but adjust POWER SET control R140 for t, then perform the steps shown below.

ADJUST	METERING POINT	DESIRED READING
L102	TP3	Switch to the higher frequency and adjust L102 for peak reading at TP3.
L107	RF Output	Adjust L107 1/4 turn CW
R140	RF Output	Alternately switch between the lower and the higher transmit frequency and adjust R140 so that the channel with the lowest power output reads 12 W on 10 W models or 21 W on 20 W models. If the maximum power output on either channel is less than 12 or 21 watts but more than 10 or 20, set R140 so that power output just begins to drop (less than 1/2 watt). With channel separations in excess of 1.2 MHz but not exceeding 2 MHz, power out is 6 watts on 10-watt models and 13 watts on 20-watt models.
L102	TP3	After oscillators are set on frequency, repeak L102 on highest transmit frequency.

NOTE

If the maximum power output obtainable is less than 12 watts on 10-watt radios or 21 watts on 20-watt radios, go back to step 2 of the exciter alignment procedure and repeat the alignment a second time. If the maximum obtainable power output is still below 12 or 21 watts, proceed as follows:

IF MAXIMUM IS BETWEEN 12 AND 10 WATTS OR BETWEEN 21 AND 20 WATTS:

Set R140 so that power output just begins to drop (less than 1/2 watt). This ensures that the drive regulator circuit is in operation.

IF MAXIMUM IS LESS THAN 10 WATTS OR 20 WATTS:

The transmitter may be malfunctioning. Refer to the transmitter schematic diagram for troubleshooting information.

OSCILLATOR FREQUENCY ADJUSTMENT

Oscillators should be set on frequency AFTER transmitter has been aligned and BEFORE modulation deviation is set.

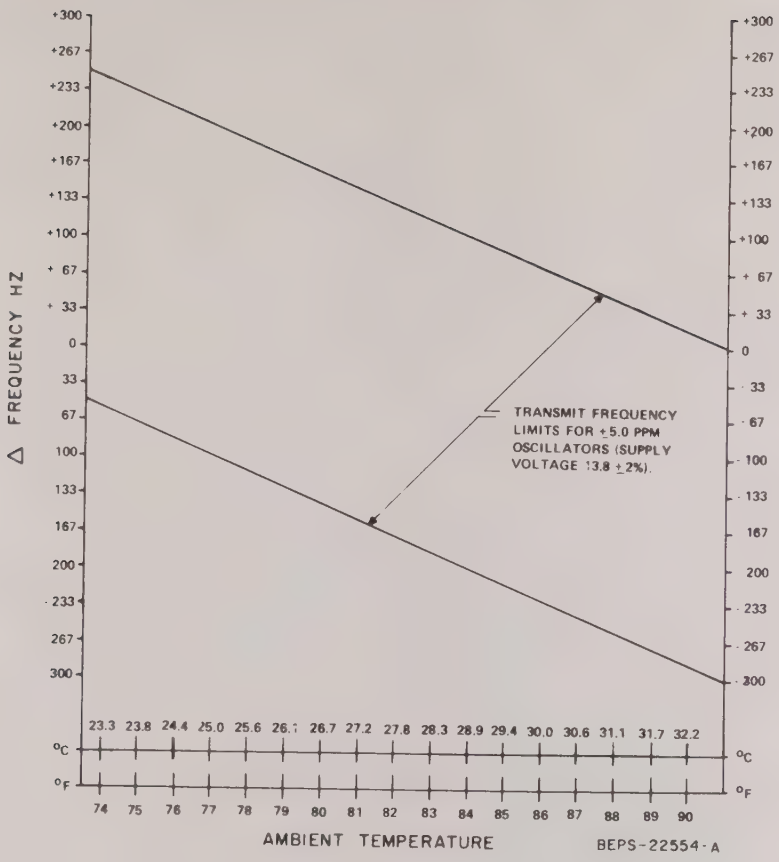
SET-UP:

1. Set up the frequency meter or counter controls as required.
2. *In "Private-Line" (PL) radios,* remove the "Vibrasponder" resonant reed from its socket on the PL board. *In "Digital Private-Line" (DPL) radios,* disable the DPL encoder by shorting together the "code disable" plating pads on the DPL board.

FREQUENCY ADJUSTMENT PROCEDURE

STEP	PROCEDURE
1	Select F1
2	Key transmitter with no modulation
3	Adjust L101 for F1 frequency ± 100 Hz
	Two-Frequency Models Only
4	Select F2
5	Adjust L114 for F2 frequency ± 100 Hz

ACCEPTABLE LIMITS FOR FIELD FREQUENCY MEASUREMENTS



IDC ADJUSTMENT

Oscillator frequency adjustment must be made BEFORE setting the IDC controls.

SET-UP:

1. Set the deviation meter operating controls as needed.

2. *In PL radios*, remove the "Vibrasponder" resonant reed from its socket on the PL board.
   In DPL radios, disable the DPL encoder by shorting together the "code disable" plating pads on the DPL board.

3. Disconnect the microphone white wire from pin (U) and connect the output of an audio signal generator as follows:

   - High side through a 1 uF capacitor (+ end toward the radio) to pin (U)
   - Low side to radio chassis.

NOTE

The transmitter can be keyed by pressing the microphone PTT button or by shorting pin (X) to the radio chassis.

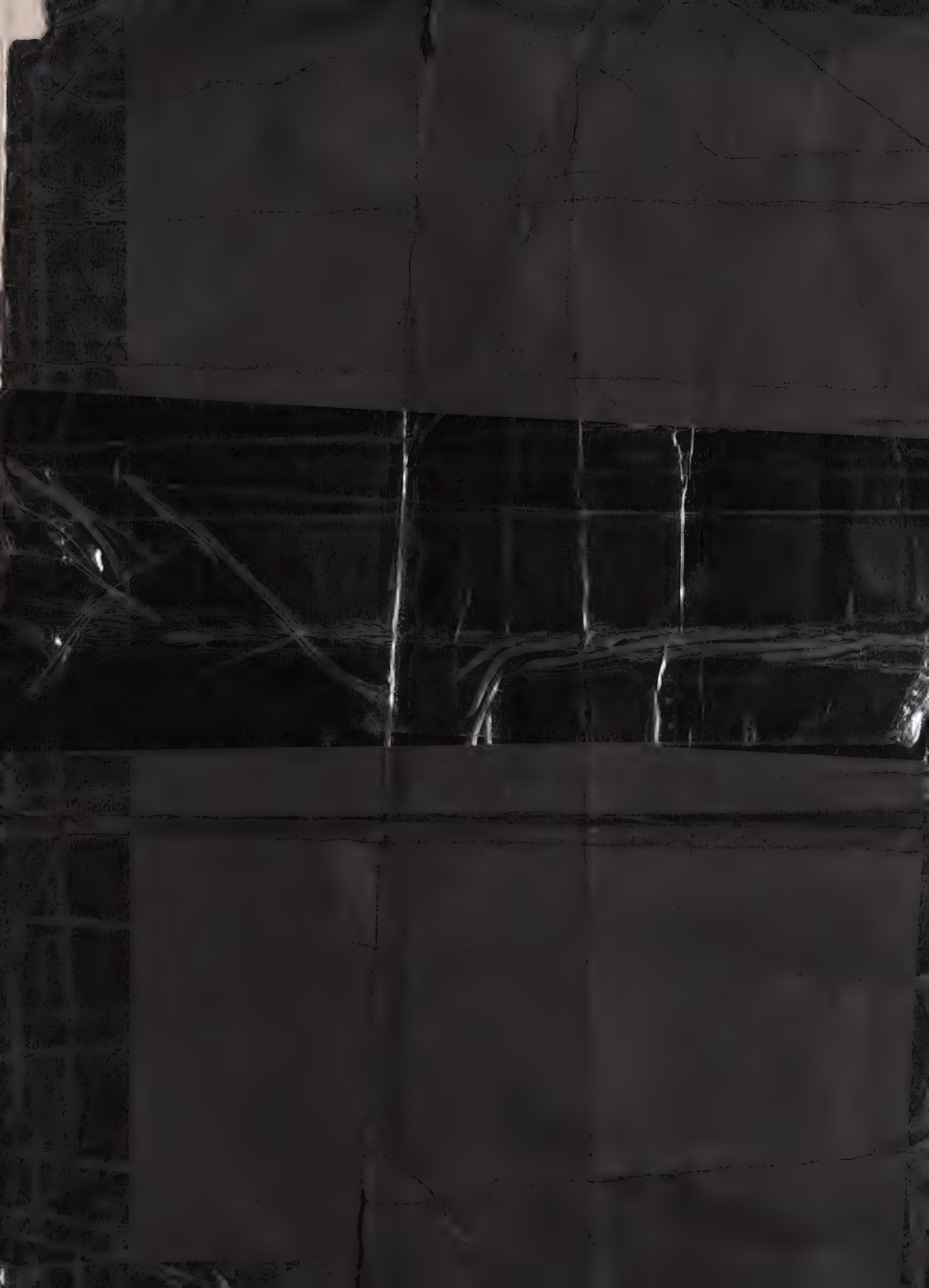
4. Connect an ac voltmeter across the audio signal generator output.

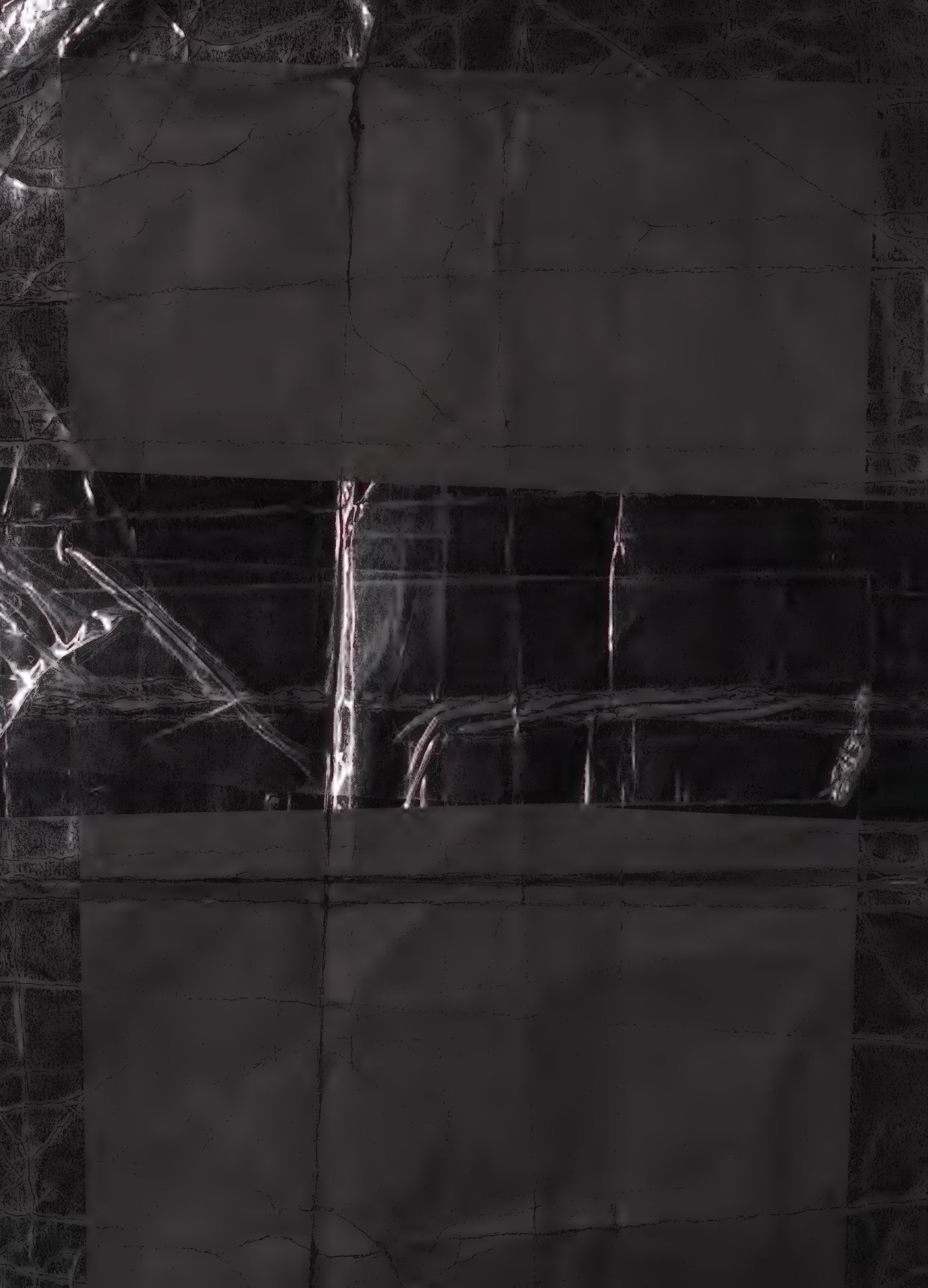
IDC ADJUSTMENT PROCEDURE

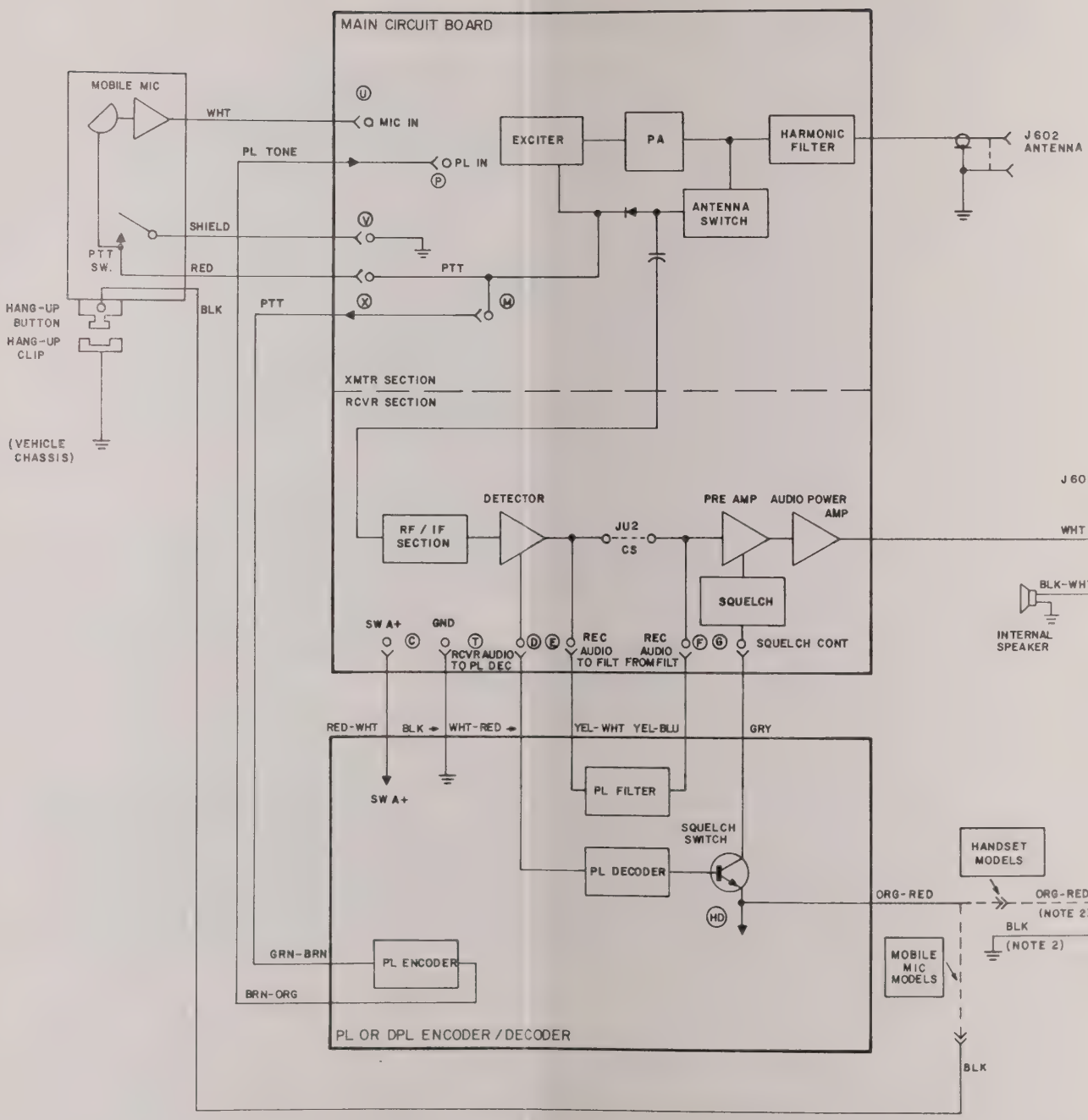
STEP	PROCEDURE
1	Set audio signal generator output frequency to 1000 Hz and output level to 0.8 V.
2	Select F1 and key transmitter. Adjust F1 "IDC" control R115 for ±5 kHz deviation meter reading.
3	On 2-freq. models, select F2 and key transmitter. Adjust F2 "IDC" control R131 for ±5 kHz deviation meter reading.
4	Reduce audio signal generator output level until deviation meter reads ±3.0 kHz. Audio oscillator output level should be 165 mV ±3 dB.
	"PRIVATE-LINE" MODELS ONLY
5A	Insert resonant reed into socket on PL board and disconnect audio oscillator from pin (U)
6A	Key transmitter and adjust Tone Level control R433 for PL tone deviation reading of 800 Hz.
7A	Reconnect audio signal generator to pin (U) and repeat steps 1 through 3. Be sure overall deviation does not exceed ±5 kHz, including PL tone.
8A	Reconnect white wire from microphone to pin (U) .
	or
	"DIGITAL PRIVATE-LINE" MODELS ONLY (SEE NOTE)
5B	Remove the short from between the "code disable" plating pads on the DPL board and disconnect the audio signal generator from pin (U) .
6B	Key the transmitter and adjust Code Level set control R342 for a DPL code deviation reading of 750 Hz.
7B	Reconnect the audio signal generator to pin (U) . Repeat steps 5 and 6. Be sure overall deviation does not exceed ±5 kHz, including DPL code.
8B	Reconnect white wire from microphone to pin (U) .

NOTE

To obtain accurate measurement of transmitter deviation in radios equipped with "Digital Private-Line" binary-coded squelch, the frequency response of the deviation measuring equipment must be <1 Hz. If a deviation meter with this low frequency response characteristic is not available, the transmitter deviation can be checked by making the transmitter send continuous sinewave during the measurement. Standard test equipment will then provide an accurate deviation measurement. To make the transmitter send continuous sinewave, short together the base and emitter plating of PTT inverter Q309, cut the jumper between C322 and ground, and key the transmitter. When the IDC alignment is completed, replace the jumper between C322 and ground.







Functional Interconnect Diagram
Motorola No. DEPS-23922-O
3/31/77-NPC

NOTES:

1. JU2 ADDED FOR CARRIER SQUELCH RADIOS.

2. A) J601–1 ORN–RED WIRE IS A JUMPER USED TO CONNECT THE ORN–RED WIRE FROM THE "PRIVATE–LINE" OR "DIGITAL PRIVATE–LINE" BOARD TO THE CONNECTOR J601. GROUND IS SUPPLIED THROUGH BLACK GROUND WIRE WHICH M MUST BE ADDED FROM J601–2 TO CHASSIS. (ALL WIRES ARE SUPPLIED WITH PL OR DPL HANDSETS.)

   B) IF HANG–UP BOX IS USED WITH CARRIER SQUELCH RADIO, GROUND WIRE (P/O TRN6209A GROUND WIRE KIT) MUST BE ADDED FROM J601–2 TO CHASSIS.

3. WHEN THE OPTIONAL EXTERNAL SPEAKER IS USED, THE JUMPER BETWEEN PINS 9 AND 12 OF ACCESSORY/ POWER CONNECTOR P601 IS REMOVED.

DEPS-23922-0

REFERENCE SYMBOL	PART NO.	DESCRIPTION

PARTS LIST

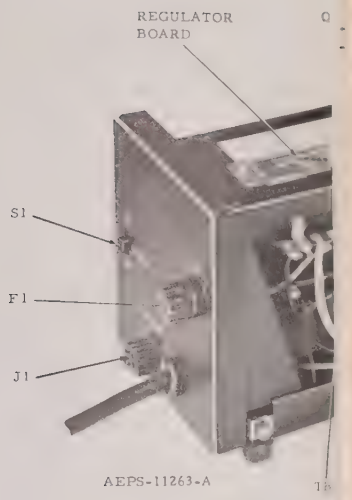
TLN5274A Regulator Board — PL-2257-B

		CAPACITOR, fixed: uF;
C1	8-82905G02	.022 ±10%; 50 V
C2	23-83210A08	100 +150-10%; 25 V
C3, 4	8-82905G02	.022 ±10%; 50 V
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR5	48-82392B03	silicon
		TRANSISTOR: (SEE NOTE)
Q1, 2	48-869170	NPN; type M9170
		RESISTOR, fixed: ±5%; 1/2 W: unless otherwise stated
R1	6-400812	470
R2	6-400459	1.5k
R3	6-400422	33
R4	17-82177B40	200; 5 W
R5, 6	6-5593	470 ±10%; 1 W
R7, 8	6-6411	1k
R9, 10	6-6320	10k ±10% (NOTE: Use is optional; determined at factory)
R11	6-6393	1.2k ±10%
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
VR1	48-83696E01	silicon; Zener type; 6.8 V ±5%

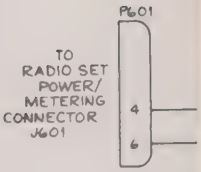
TRN6282A Power Supply Chassis — PL-3349-B

		CAPACITOR, fixed:
C1	23-82464C08	11,000 uF +75-10%; 35 V
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR1, 2	48-82732C07	silicon
CR3, 4	48-82732C10	silicon
		CONNECTOR, receptacle:
J1		includes: 15-10183A52 INSULATOR, 6-contact 29-82335A01 CONTACT, male; 4 req'd. (P/O Model TLN5219A)
		FUSE, cartridge:
F1	65-804908	slow-blow type; 2 A
		LINE CORD:
P1	30-83212F01	includes: ac plug
		TRANSISTOR: (SEE NOTE)
Q3	48-869677	PNP; type M9677
Q4, 5	48-869244	NPN; type M9244
		SWITCH, slide:
S1	40-84622B02	DPST
		TRANSFORMER, power:
T1	25-83594E02	pri: res 2.75 Ohms sec: res 0.11 Ohm
		TERMINAL STRIP:
TB1	31-121700	8 terminals; No. 2 & 7 mtg.
		FUSEHOLDER:
XF1	9-82083C01	extractor post type
NON-REFERENCED ITEMS		
	26-84923B03	HEATSINK
	1-80745B88	HOUSING, power supply

NOTE: Replacement diodes and transistors must be ordered by listed part number only for optimum performance.

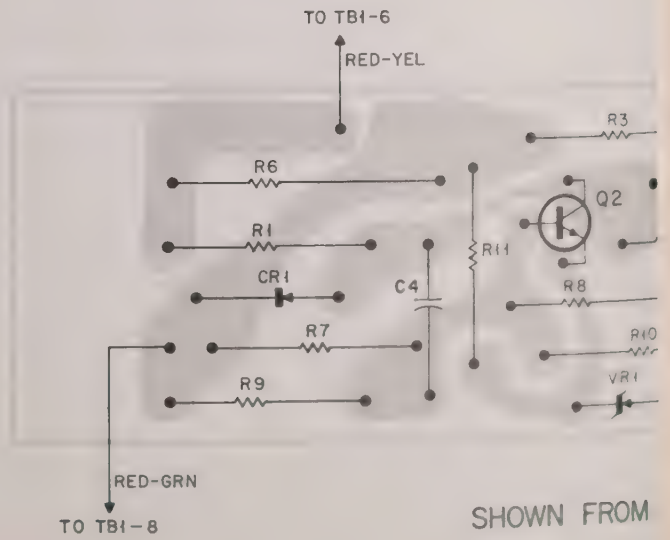


C

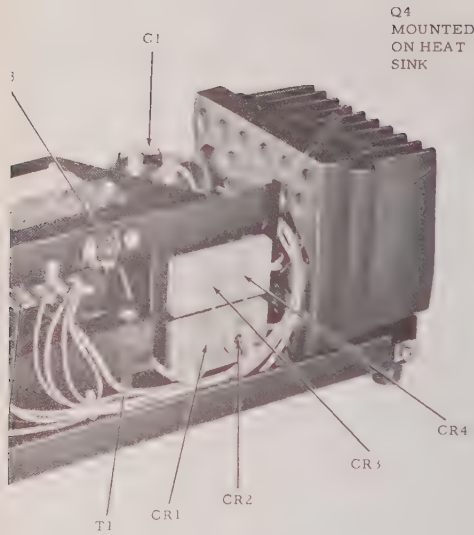


MODEL TABLE

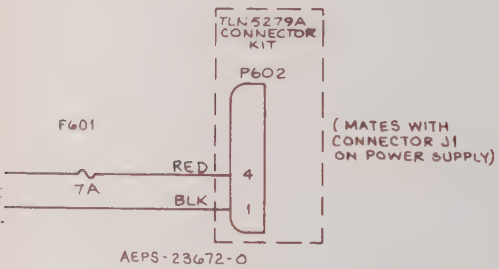
MODEL	SUB-M
TPN1136A	TLN52
	TRN62
	TLN52



SHOWN FROM

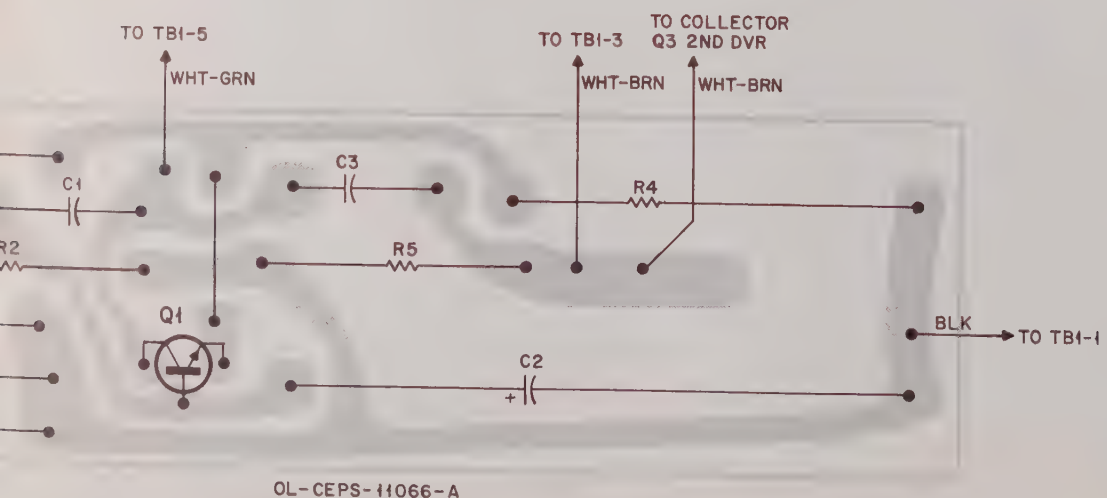


ABLE DETAIL



ODEL	VERSION	DESCRIPTION
4A	0	REGULATOR BOARD
2A	0	POWER SUPPLY CHASSIS
9A	0	CONNECTOR KIT

EPS–17211–B



OL-CEPS-11066-A

SOLDER SIDE

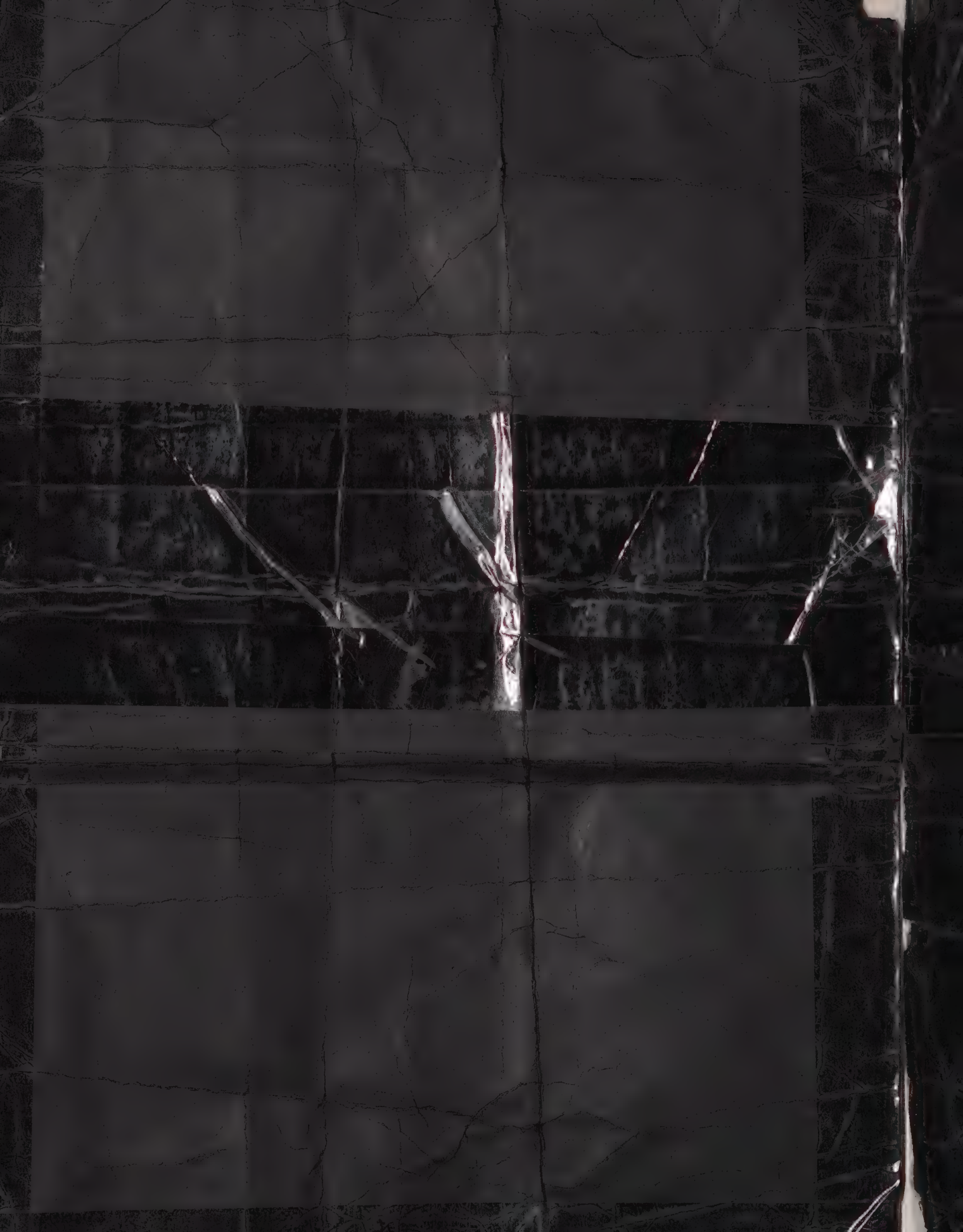
TO OPTIONAL
REMOTE
ON-OFF SW

TRANSIS
Q1, Q2
C
E
B

Q4, Q5
C
B
E

NOTES:
1. UNLESS O
RESISTOR
2. CHASSIS P
TLN5238
3. R9 AND R
FACTORY.

FLOATING
GROUND

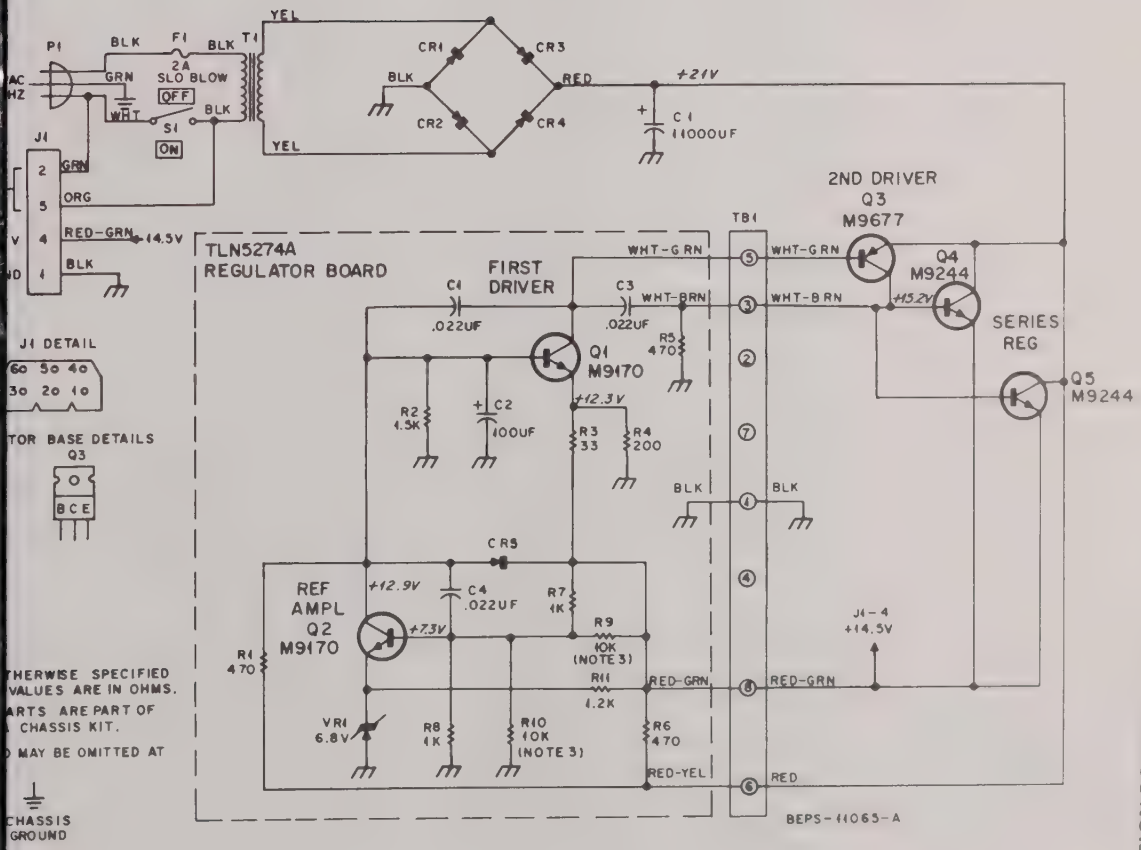


FIXED STATION POWER SUPPLY

MODEL TPN1136A

FUNCTION

Provides the entire radio with regulated +14.5 V DC when used in a 120 V AC primary power fixed installation.

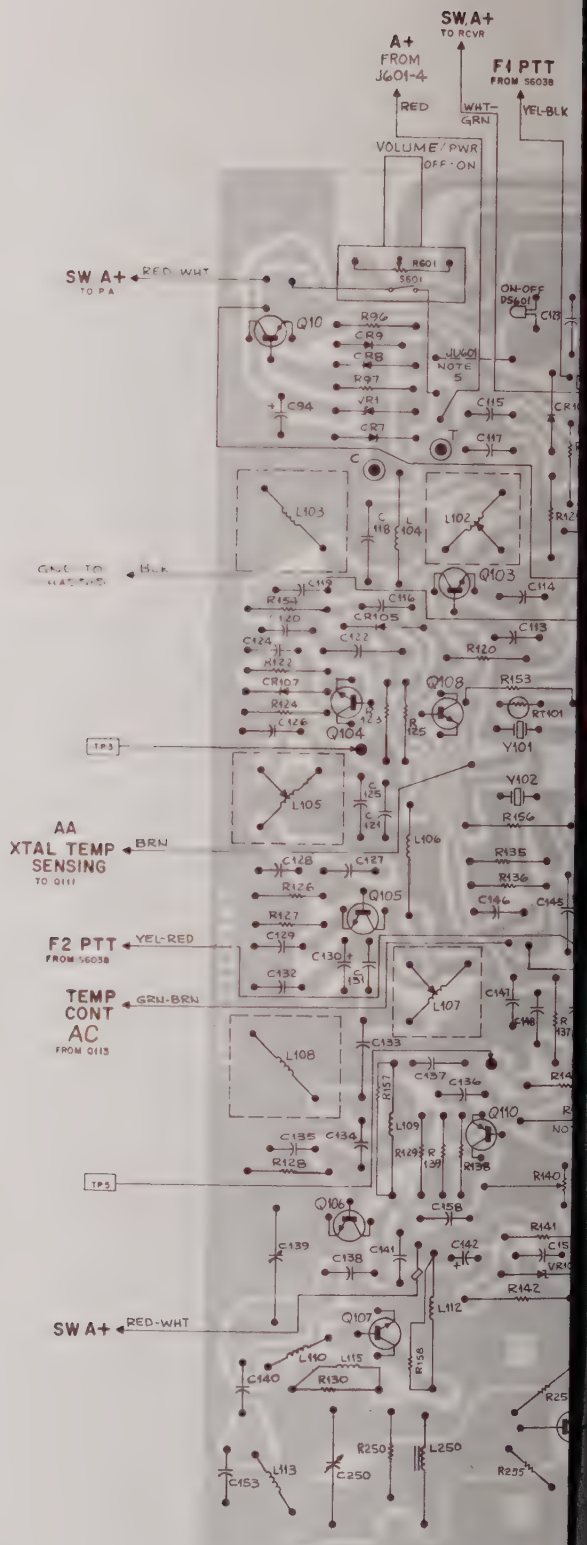


BASE STATION POWER SUPPLY/
RADIO CIRCUIT BOARD DETAIL

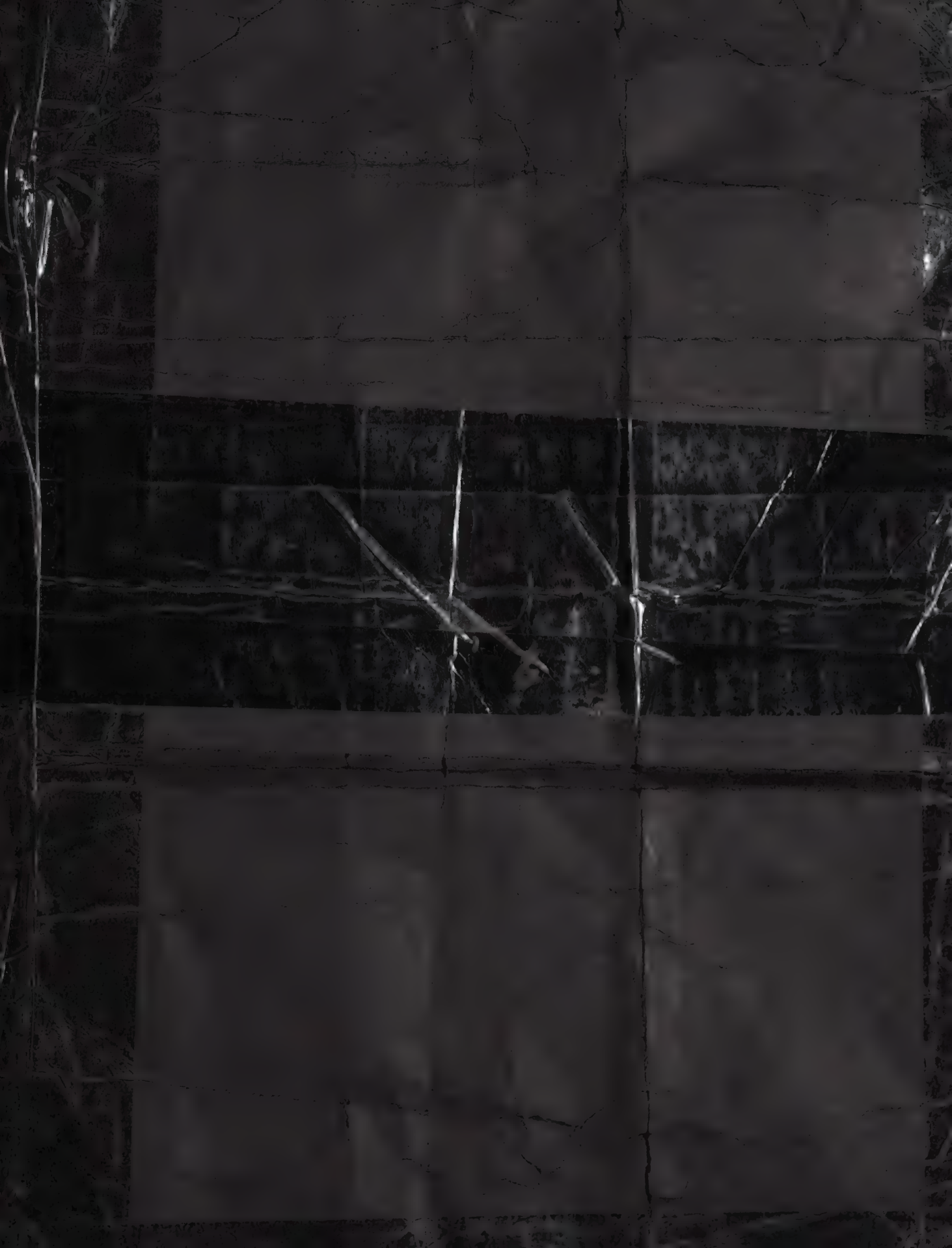
68P81029E96-B
3/31/77-NPC

UNIFIED CHASSIS

CIRCUIT BOARD DETAIL



68P81034E51-O
(Sheet 1 of 4)
3/31/77-NPC



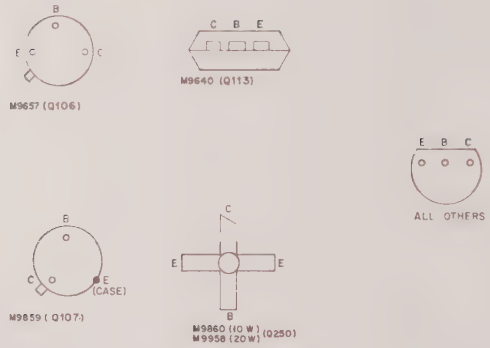
PTT
TO S603B
SQUELCH DC
FROM Q6
EMITTER
AB
GRN
BLU
SQUELCH
TEMP
CONT
A C
SPKR GND
BLK
AUDIO
TO SPKR
GRN-BRN
XTAL
TEMP
SENSING
A A
BLU-WHT
SPKR
AUDIO
FROM J601-9
BRN
RCVR
AUDIO
TO 601-12
BLK-WHT
AUDIO
FOR HANDSET
(OPTIONAL)
WHT
Q113
Q111
XMIT
DS602
RED-WHT
SW A+
Q112
TP2
Q5
F
JU2 CS
WHT-RED
PTT
TO ANT SW
SQUELCH DC
BLU
AB
TO SQUELCH
CONTROL R602
TP1
Q6
Q8
Q7
Q11
Q102
Q4
YEL-BLU
RCVR F2 SEL
FROM S603A
Q3
Q9
Q2
Q250
Q1
TP7
RCVR
F1 SEL
FROM
S603A
YEL-GRN
TO ANTENNA
PTT
WHT-RED
RED YEL
SW A+

PUSH-PIN TABLE

PIN	WIRE COLOR	FUNCTION
	RECEIVER	
A	YEL-GRN	RCVR F1 SELECT FROM S603*
B	YEL-BLU	RCVR F2 SELECT FROM S603*
C	RED-WHT	SWITCHED A + TO PL BOARD**
D	WHT-RED	PL TONE TO PL BOARD DECODER INPUT**
E	YEL-WHT	AUDIO TO PL BOARD AUDIO HIGH-PASS FILTER INPUT**
F	YEL-BLU	AUDIO FROM PL BOARD AUDIO HIGH-PASS FILTER OUTPUT**
G	GRAY	SQUELCH CONTROL FROM PL BOARD SQUELCH SWITCH**
	TRANSMITTER	
M	GRN-BRN	PTT TO PL BOARD**
P	BRN-ORG	PL TONE FROM PL BOARD ENCODER OUTPUT**
T	BLK	PL GROUND
U	WHT	MICROPHONE AUDIO HIGH
V	SHIELD	MICROPHONE AUDIO LOW
W	BLK	MICROPHONE PTT GROUND
X	RED	MICROPHONE PTT

*USED IN 2-FREQUENCY MODELS ONLY
**USED IN PL AND DPL MODELS ONLY

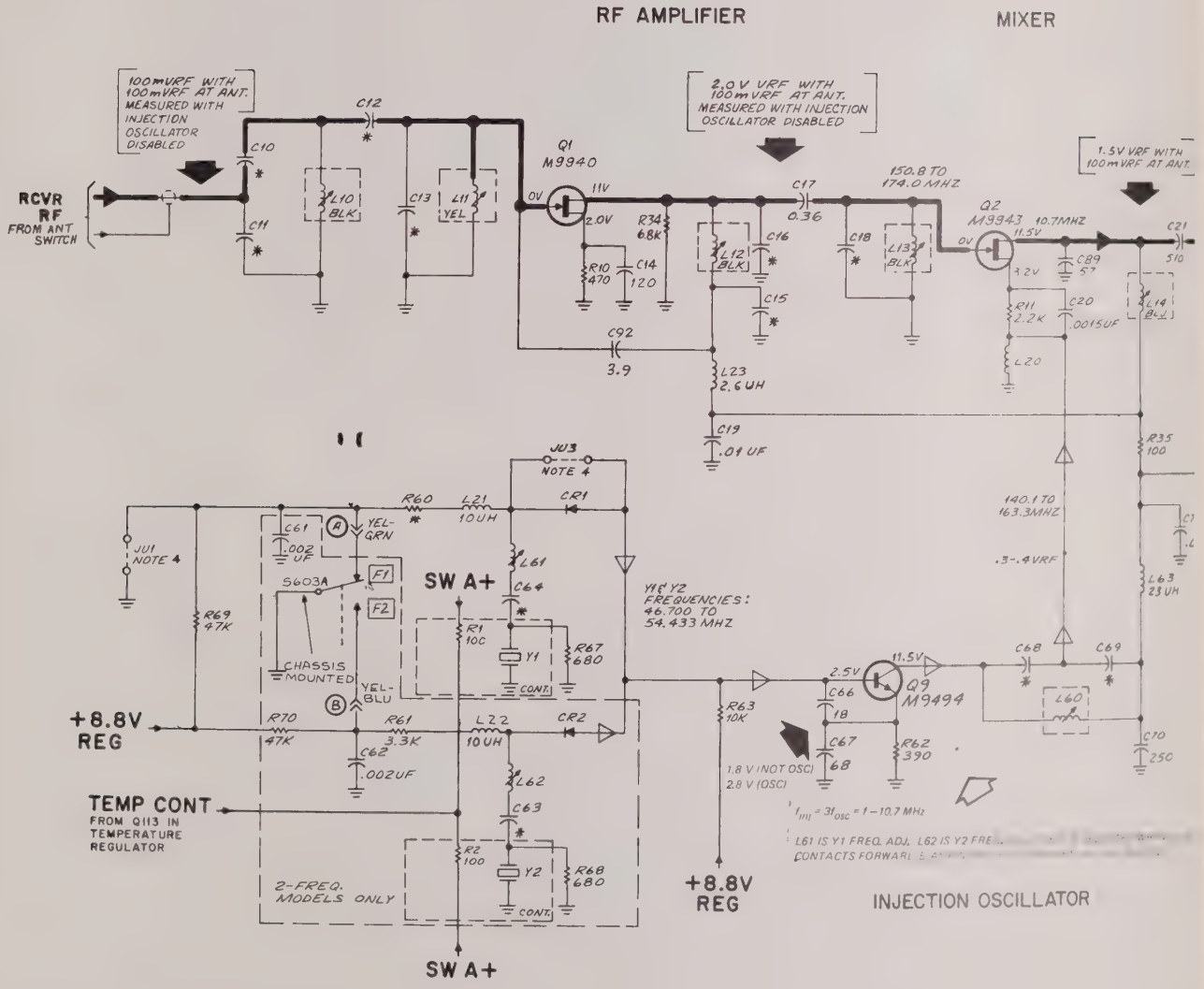
TRANSISTOR BASE DETAILS
(LEAD SIDE)



NOTE
SOME COMPONENTS SHOWN ARE NOT USED IN SOME RADIO MODELS. SEE PARTS LIST FOR SPECIFIC INFORMATION.

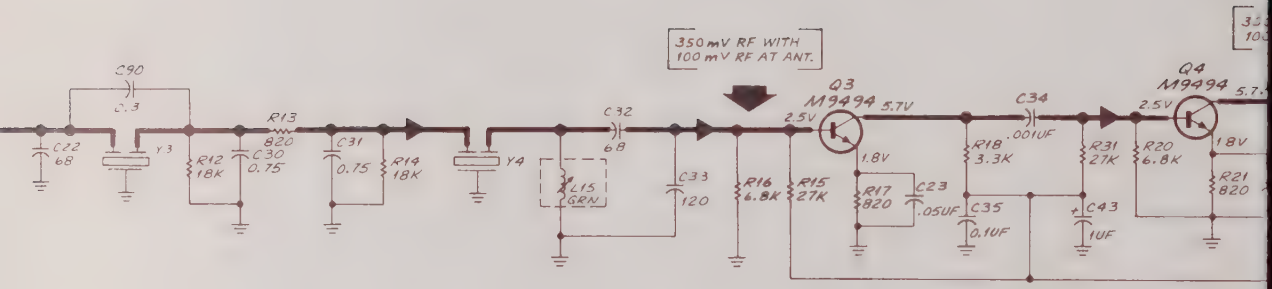
JUMPER TABLE

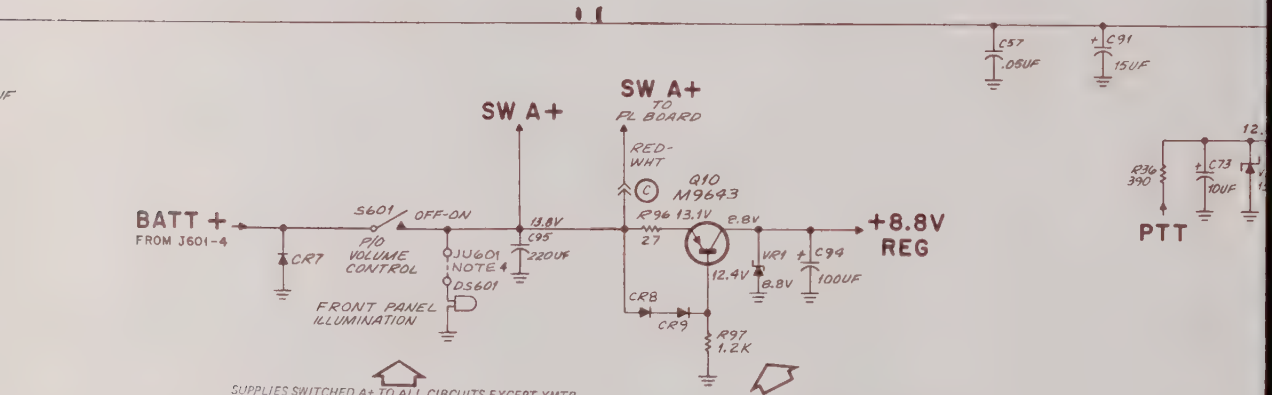
JUMPER NUMBER	IN	OUT
JU1	SINGLE-FREQUENCY RECEIVER MODELS	TWO-FREQUENCY RECEIVER MODELS
JU2	CARRIER SQUELCH MODELS	"PRIVATE-LINE" TONE-CODED SQUELCH MODELS
JU3	SINGLE-FREQUENCY RECEIVER MODELS (CR1 OUT)	TWO-FREQUENCY RECEIVER MODELS (CR1 IN)
JU101	SINGLE-FREQUENCY TRANSMITTER MODELS	TWO-FREQUENCY TRANSMITTER MODELS
JU601	ALL MODELS	OPTIONAL (DISABLES PWR ON LAMP)


RF AMPLIFIER
MIXER
100mVRF WITH 100mVRF AT ANT. MEASURED WITH INJECTION OSCILLATOR DISABLED
2.0V VRF WITH 100mVRF AT ANT. MEASURED WITH INJECTION OSCILLATOR DISABLED
1.5V VRF WITH 100mVRF AT ANT.
RCVR RF FROM ANT. SWITCH
C10
C11
C12
C13
L10 BLK
L11 YEL
Q1 M9940
11V
0V
2.0V
R34 6.8K
R10 470
C14 120
C15
C16
L12 BLK
C17 0.36
C18
L13 BLK
150.8 TO 174.0 MHZ
Q2 M9943
10.7MHZ
11.5V
3.2V
C89 57
C21 510
R11 2.2K
C20 .0015UF
L14 BLK
L20
C92 3.9
L23 2.6 UH
C19 .01 UF
R35 100
JU3 NOTE 4
CR1
R60
L21 10UH
C61 .002 UF
YEL-GRN
JU1 NOTE 4
S603A
F1
F2
SW A+
L61
C64
R69 47K
CHASSIS MOUNTED
YEL-BLU
R1 100
Y1
R67 680
CONT.
Y1 & Y2 FREQUENCIES: 46.700 TO 54.433 MHZ
140.1 TO 163.3MHZ
.3-.4 VRF
L63 23 UH
C68
C69
+8.8V REG
R70 47K
R61 3.3K
L22 10UH
CR2
C62 .002UF
L62
C63
R63 10K
2.5V
11.5V
Q3 M9494
C66 18
C67 68
R62 390
L60
C70 250
1.8 V (NOT OSC)
2.8 V (OSC)
TEMP CONT
FROM Q113 IN TEMPERATURE REGULATOR
R2 100
Y2
R68 680
2-FREQ. MODELS ONLY
+8.8V REG
SW A+
INJECTION OSCILLATOR

4-POLE 10.7 MHZ
CRYSTAL FILTER

10.7 MHZ IF AMPLIFIER





SUPPLIES SWITCHED A+ TO ALL CIRCUITS EXCEPT XMTR & RCVR OSCILLATORS, & SQUELCH CIRCUIT. CR7 PROVIDES REVERSE POLARITY PROTECTION.

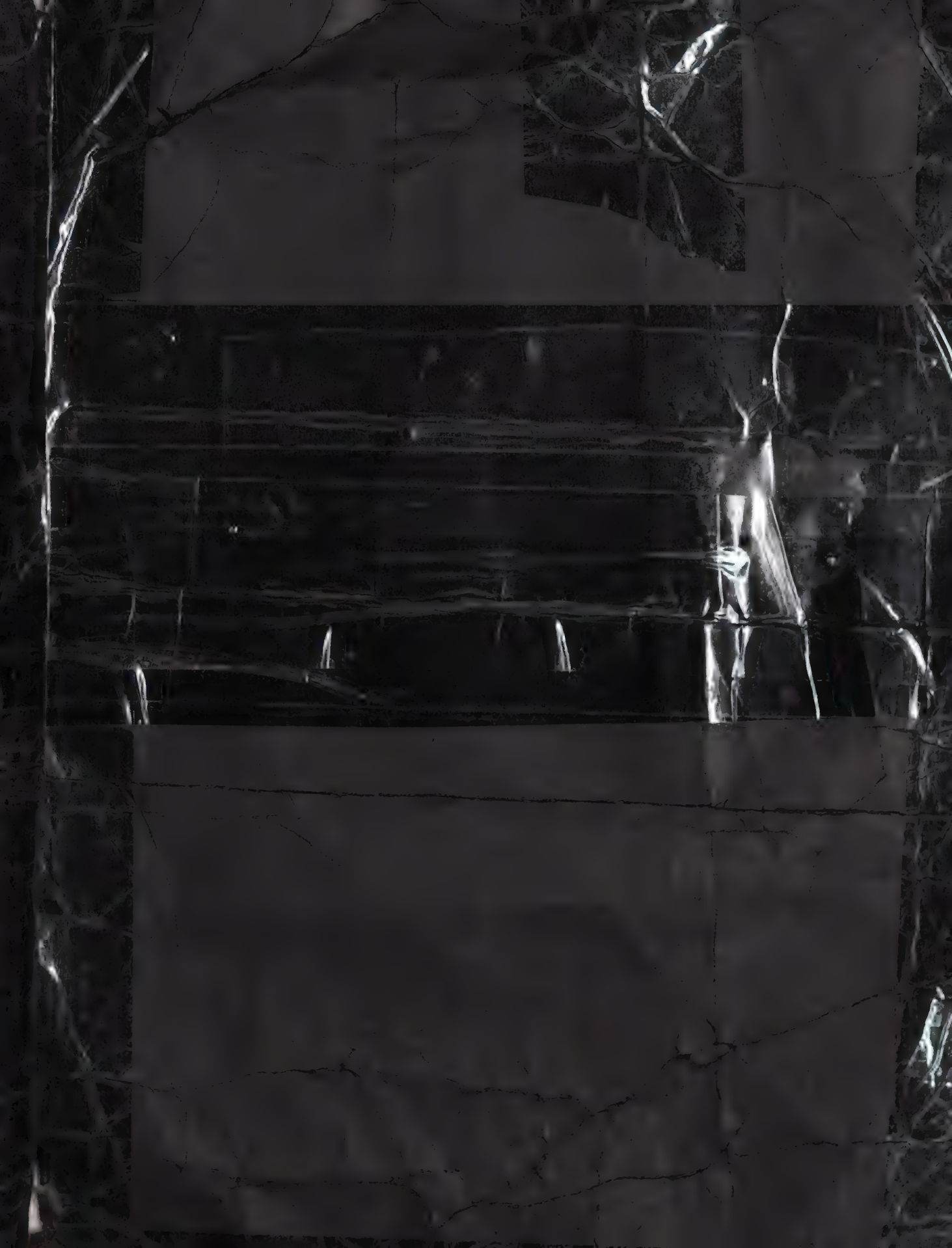
DC DISTRIBUTION

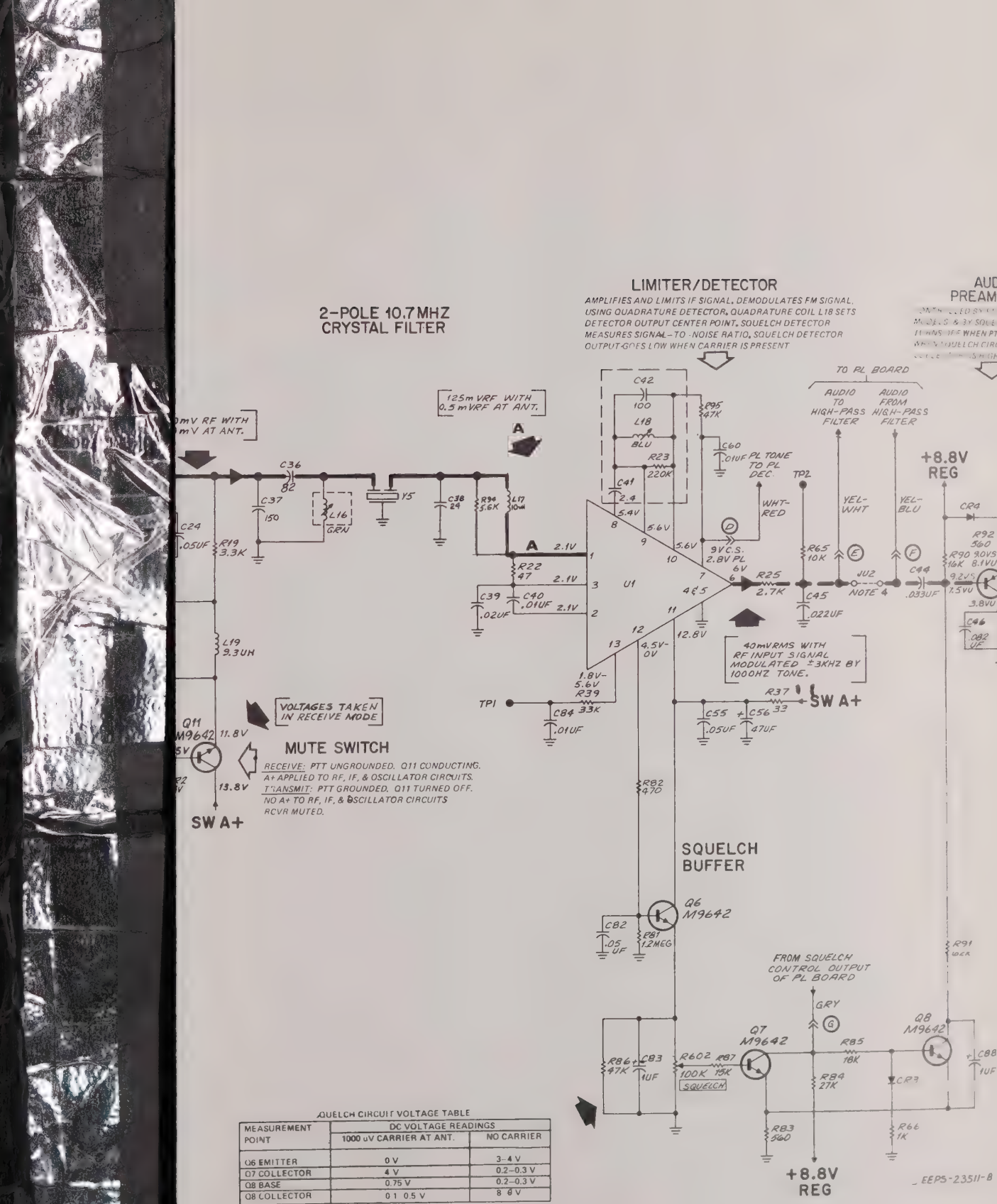
SUPPLIES REGULATED +8.8 V TO XMTR & RCVR OSCILLATORS, SQUELCH CIRCUIT & AUDIO PREAMPLIFIER. Q10 PROVIDES CURRENT REGULATION VR1 PROVIDES VOLTAGE REGULATION

VOLTAGE REGULATOR

CAUTION

WHEN S601 IS ON, DC POWER IS APPLIED AT ALL CIRCUITS IN THE RADIO





SQUELCH CIRCUIT VOLTAGE TABLE

MEASUREMENT POINT	DC VOLTAGE READINGS	
	1000 uV CARRIER AT ANT.	NO CARRIER
Q6 EMITTER	0 V	3-4 V
Q7 COLLECTOR	4 V	0.2-0.3 V
Q8 BASE	0.75 V	0.2-0.3 V
Q8 COLLECTOR	0.1 0.5 V	8 8 V

NOTES

1 COMPONENTS MARKED WITH AN ASTERISK HAVE DIFFERENT VALUES OR TYPE NUMBERS ON DIFFERENT RADIO MODELS. SEE UNIFIED CHASSIS PARTS LIST

2 UNLESS OTHERWISE NOTED, RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES ARE IN PICOFARADS

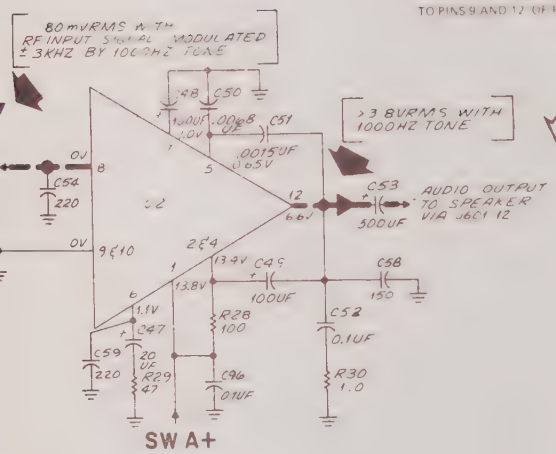
3 UNLESS OTHERWISE NOTED, DC VOLTAGES ARE MEASURED WITH A 20,000 OHM PER VOLT METER AND RF VOLTAGES ARE MEASURED WITH AN RF VOLTMETER. [illegible] VOLTAGES MEASURED [illegible] FULLY COUNTERCLOCKWISE [illegible]

S = RCVR [illegible]
U = RCVR [illegible]

4 JUMPER CONNECTIONS ARE SHOWN IN THE FOLLOW NO TABLE

JUMPER NUMBER	IN	OUT
JU1	SINGLE-FREQUENCY RECEIVER MODELS	[illegible]
JU2	CARRIER [illegible] AND DIGITAL PRIVATE LINE MODELS	[illegible]
JU3	SINGLE-FREQUENCY RECEIVER MODELS	[illegible]
JU101	SINGLE-FREQUENCY TRANSMITTER MODELS	[illegible]
JU601	ALL MODELS	[illegible]

5 THE RADIO IS SUPPLIED WITH A JUMPER BETWEEN PINS 9 AND 12 OF ACCESSORY PLUG P601. IF AN EXTERNAL SPEAKER IS TO BE USED, REMOVE THIS JUMPER AND CONNECT THE EXTERNAL SPEAKER TO PINS 9 AND 12 OF P601



AUDIO POWER AMPLIFIER

[illegible]

SQUELCH CIRCUIT

S AUDIO PREAMPLIFIER Q5 ON & OFF
IER SQUELCH OPERATION:
NO CARRIER DETECTED, Q8 COLLECTOR IS HIGH
TIVE, KEEPING Q5 TURNED OFF. WHEN CARRIER IS
CTED, U1 SQUELCH DETECTOR OUTPUT CAUSES Q6
TER AND Q7 BASE TO GO LOW. WHEN Q7 BASE GOES
ENOUGH, SCHMITT TRIGGER Q7–Q8 CHANGES STATE
OLLECTOR GOES LOW AND Q5 TURNS ON

E-CODED OR DIGITAL "PRIVATE LINE"
ATION:
N NO PL CODE IS DETECTED, Q8 BASE IS HELD
BY PL BOARD SQUELCH OUTPUT. Q8 COL-
TOR IS HIGH POSITIVE, KEEPING Q5 OFF.
N PL CODE IS DETECTED, PL BOARD SQUELCH
TROL OUTPUT GOES HIGH, Q8 COLLECTOR
S LOW, AND Q5 TURNS ON

LEGEND

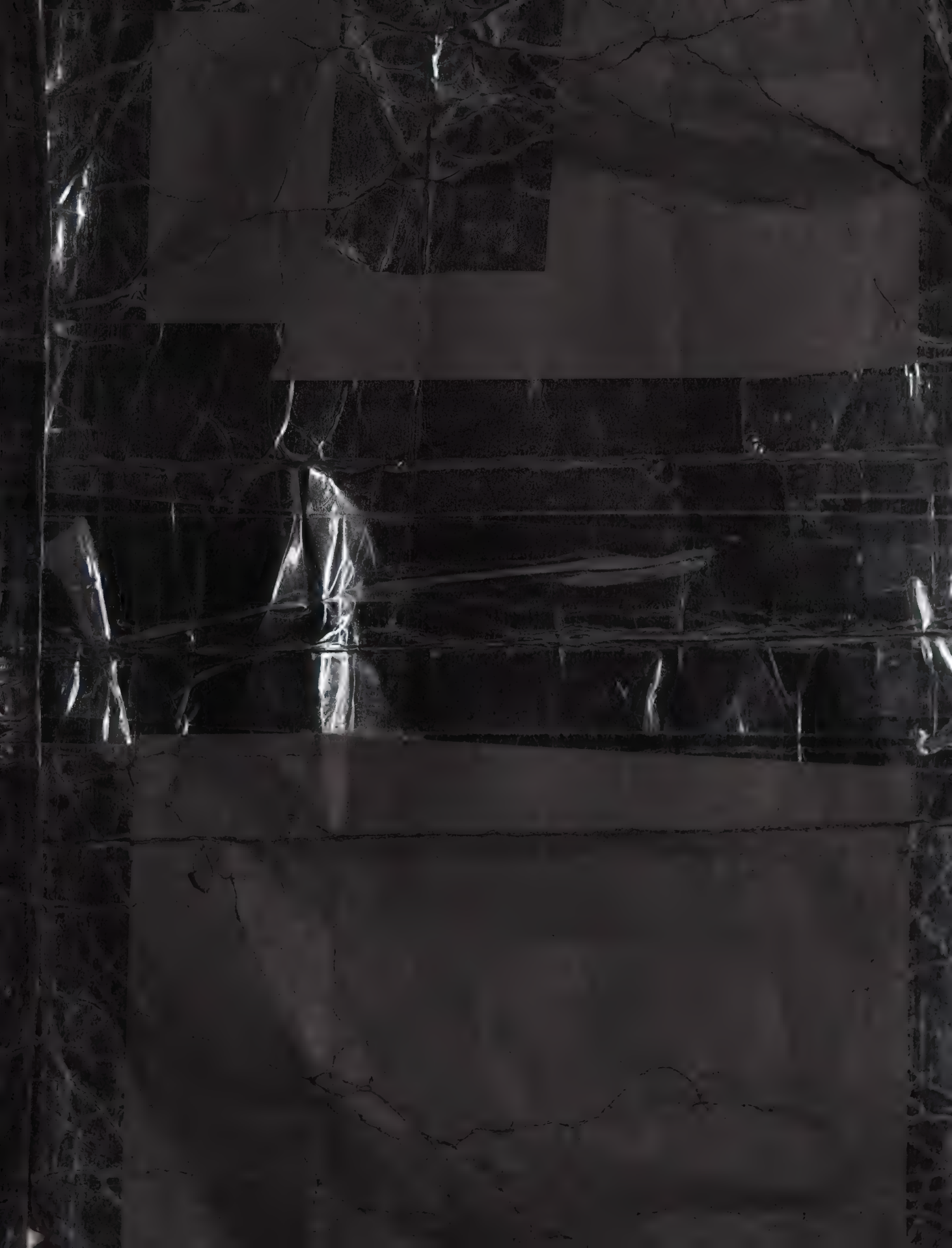
= THEORY OF OPERATION DATA

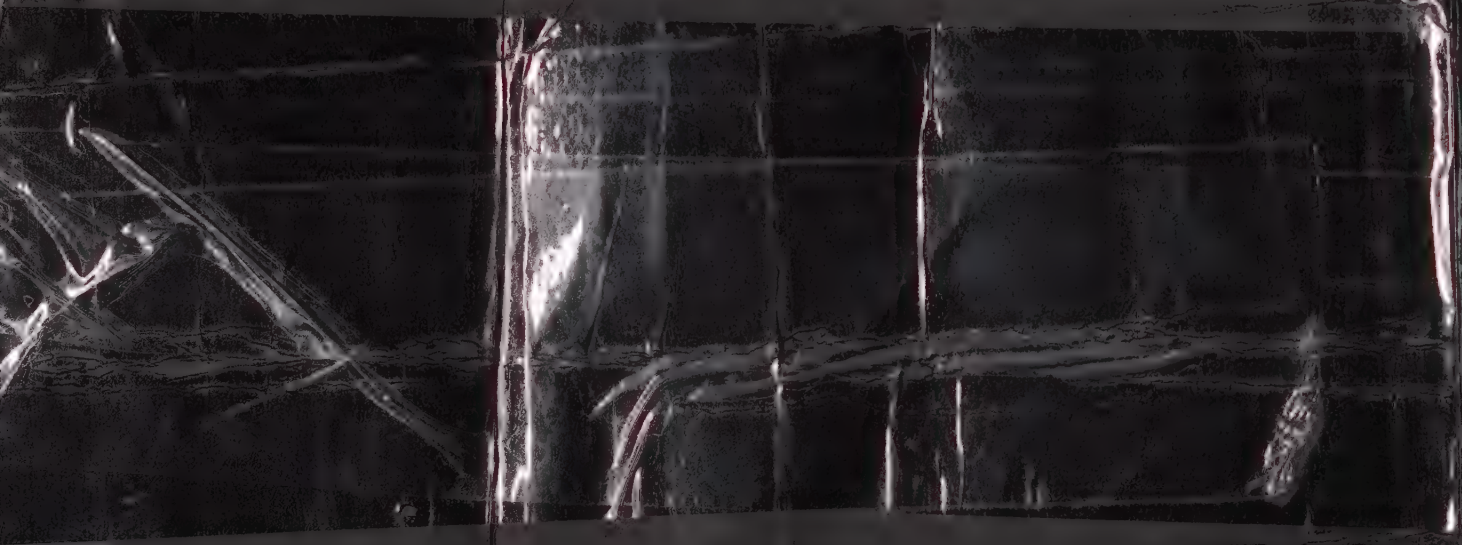
MAINTENANCE DATA

PRIMARY RF SIGNAL FLOW

SECONDARY RF SIGNAL FLOW

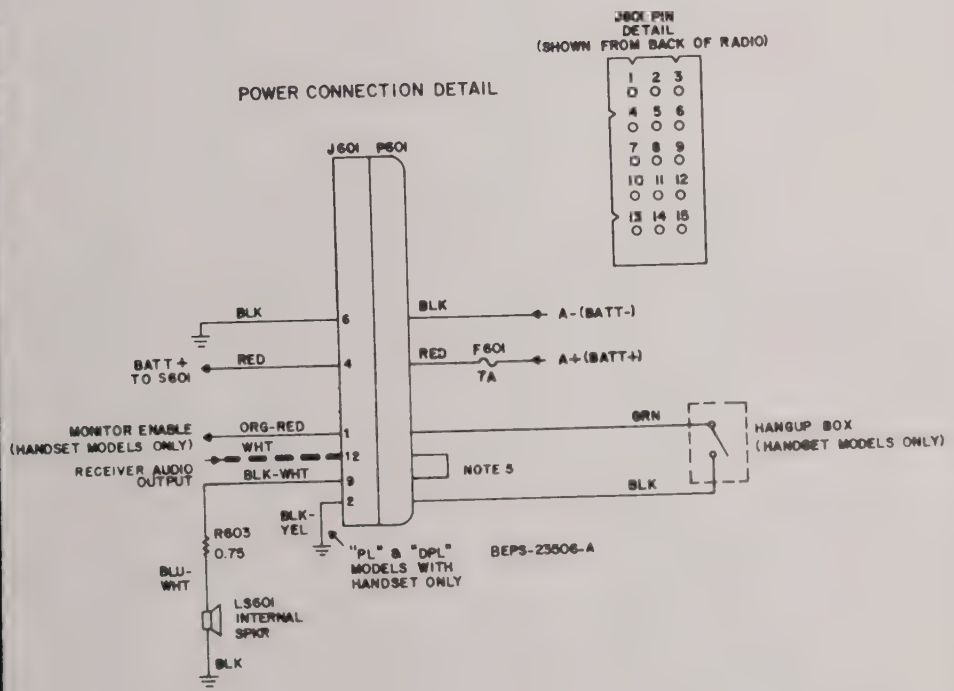
PRIMARY AUDIO SIGNAL FLOW





FUNCTION

Amplifies, mixes, filters, and demodulates received rf energy from antenna (via antenna switch) and provides an amplified audio signal to the speaker.



PARTS LIST

Unified Chassis Models:

TUD2032AB (150.8-162 MH
TUD2033AB (162-174 MHz)
TUD2032AH (150.8-162 MH
TUD2033AH (162-174 MHz)
TUD2042AB (150.8-162 MH
TUD2043AB (162-174 MHz)
TUD2042AH (150.8-162 MH
TUD2043AH (162-174 MHz)

L
M = 150.8-1
H = 162-174
A = 10 Watt
B = 20 Watt

Receiver components are n
Exciter components are nu
Power Amplifier componen
Other components are numb

REFERENCE SYMBOL	MOTOROLA PART NO.
C10 (M)	21-84713A30
C10 (H)	21-84713A35
C11 (M)	21-82133G39
C11 (H)	21-82133G83
C12 (M)	21-864519
C12 (H)	21-82450B29
C13 (M)	21-84493B40
C13 (H)	21-863466
C14	21-82877B15
C15 (M)	21-82240K05
C15 (H)	21-84713A31
C16 (M)	21-84713A35
C16 (H)	21-84713A46
C17	21-842041
C18 (M)	21-82133G76
C18 (H)	21-863466
C19	21-82428B59
C20	21-82187B18
C21	21-845214
C22	21-82610C30
C23, 24	21-82372C04
C30, 31	21-82450B06
C32	21-82610C30
C33	21-82610C09
C34	21-82187B20
C35	21-82372C01
C36	21-82610C20
C37	21-82204B54
C38	21-82133G46
C39	21-82428B26
C40	21-82428B59
C41	21-82450B14
C42	21-82358G12
C43	23-84665F04
C44	8-82905G08
C45	8-84496D07
C46	8-82905G45
C47	23-82601A03
C48, 49	23-84669A19
C50	8-84496D08
C51	21-82187B18
C52	8-84496D05
C53	23-83210A19
C54	21-83596E10
C55	21-82372C04
C56	23-84538G06
C57	21-82372C04
C58	21-82877B05
C59	21-83596E10
C60	21-82428B59
C61, 62	21-82428B25
C63 (M), 64 (M)	21-82355B15
C63 (H), 64 (H)	21-125929
C66	21-865942
C67	21-82610C30
C68 (M)	21-83406D15
C68 (H)	21-864746
C69 (M)	21-82610C02

	DESCRIPTION

z) ——— 1 freq., 10 watt
z) ——— 2 freq., 10 watt
z) ——— 1 freq., 20 watt
z) ——— 2 freq., 20 watt

EGEND
62 MHz models only
MHz models only
models only
models only PL-5332-O

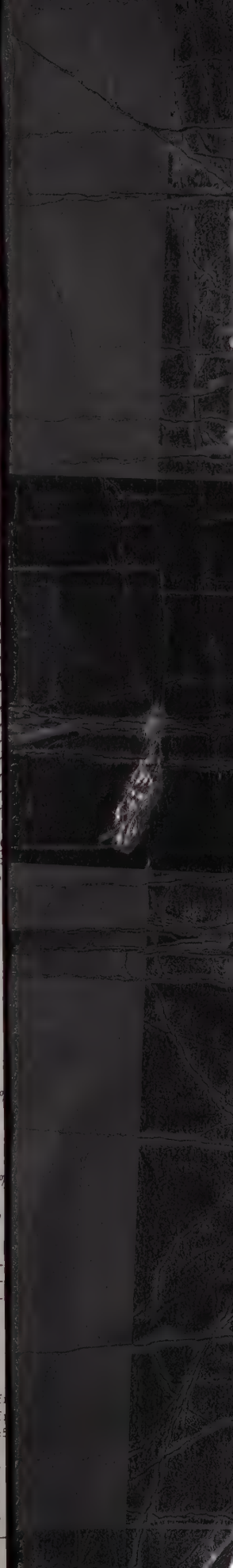
umbered 1-99
nbered 100-199
s are numbered 200-299
ered 600-699

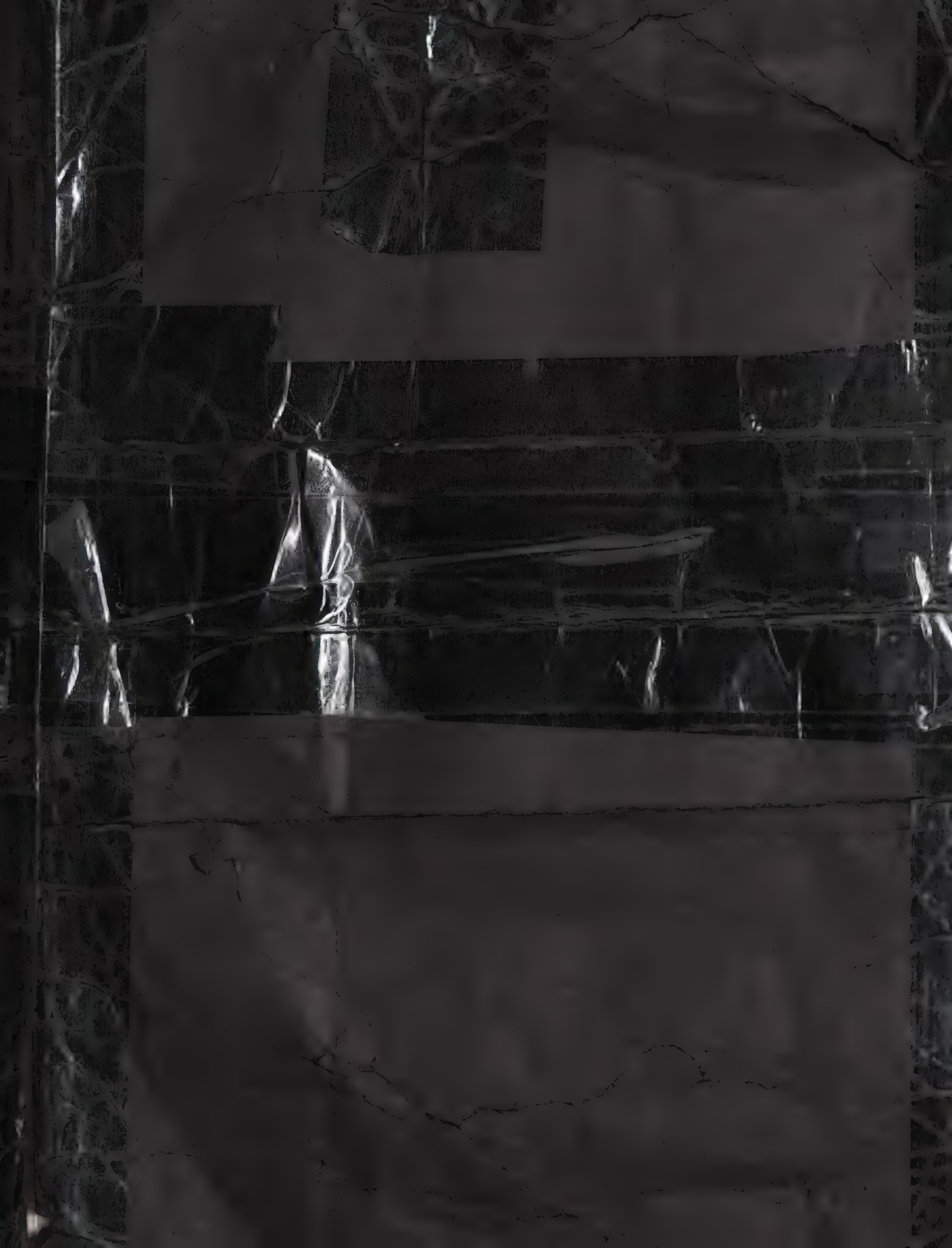
	CAPACITOR, fixed: pF ±5%; 500 V; unless otherwise stated
	10; N150
	9; N150
	36; N150
	33; N150
	0.56 ±10%
	0.51
	6.8; N150
	5; N150
	120; N150
	50; N150
	43; N150
	9; N150
	7 ±0.25 pF; N150
	0.36
	6.8 ±.2%; N150
	5; N150
	.01 uF +80-20%; 200 V
	.0015 uF ±10%; 200 V
	510
	68; 200 V
	.05 uF +80-20%; 25 V
	0.75 ±10%; 500 V
	68; 200 V
	120; 200 V
	.001 uF ±10%; 200 V
	0.1 uF +80-20%; 25 V
	82; NP0
	150 ±10%
	24
	.02 uF +80-20%; 200 V
	.01 uF +80-20%; 200 V
	2.4
	100; N080
	1 uF +150-0%; 35 V
	.033 uF ±10%; 50 V
	.022 uF ±10%; 100 V
	.082 uF ±10%; 50 V
	20 uF; 25 V
	100 uF +150-10%; 20 V
	.0068 uF
	.0015 uF ±10%; 200 V
	.1 uF
	500 uF ±10%; 15 V
	220 ±20%; 200 V
	.05 uF +80-20%; 25 V
	47 uF
	.05 uF +80-20%; 25 V
	150
	220 ±20%; 200 V
	.01 uF +80-20%; 200 V
	.002 uF ±20%; (2-freq. only)
	24; N750
	15; N750
	18; N470
	68; 200 V
	9; N150
	6; N150
	43; 200 V

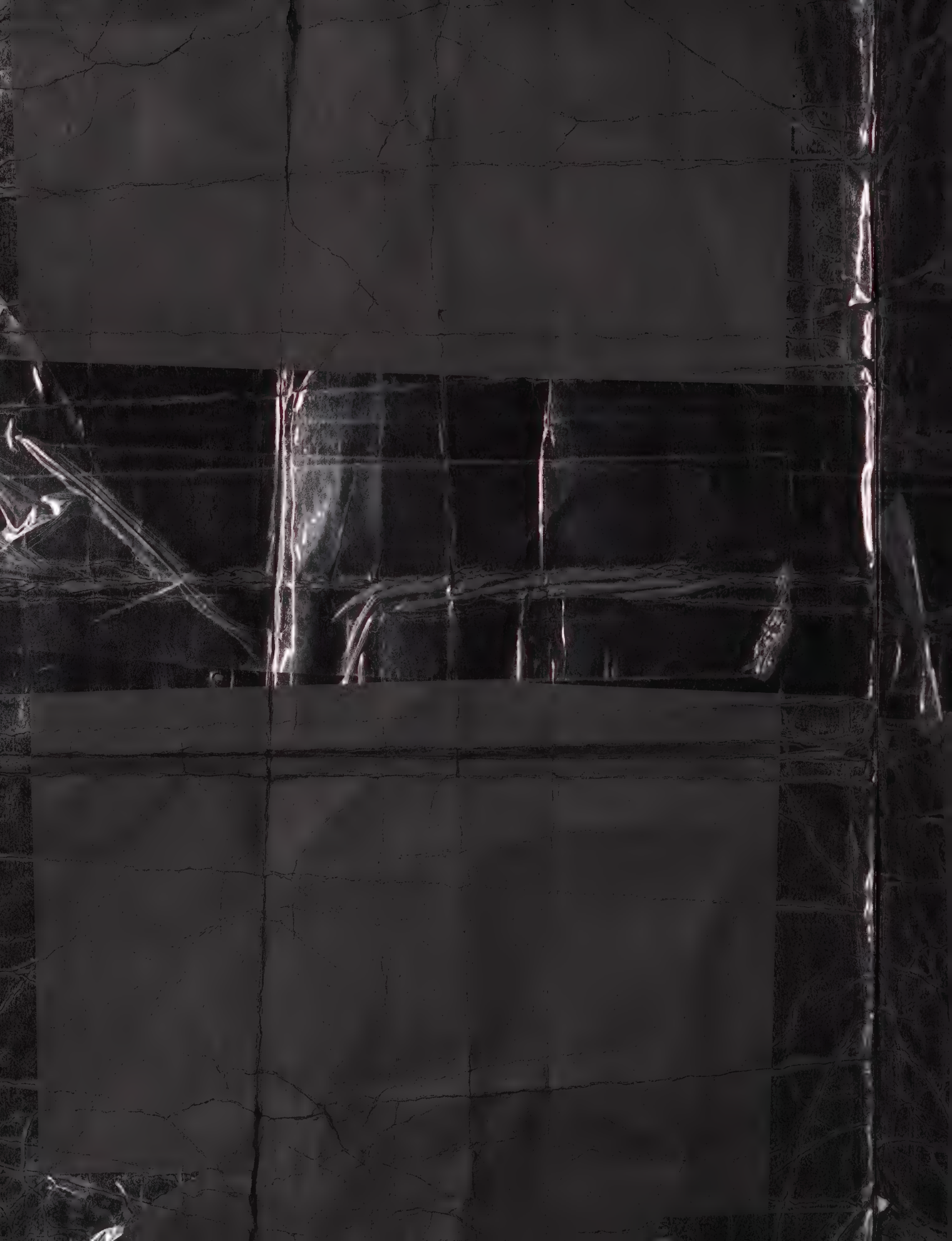
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C69(H)	21-855809	33; N150
C70	21-82877B36	250; N750
C71	21-82372C04	.05 uF +80-20% 25 V
C73	23-84665F01	10 uF
C82	21-82372C04	.05 uF +80-20%; 25 V
C83	23-84665F04	1 uF +150-0%; 35 V
C84	21-82428B59	.01 uF +80-20%; 200 V
C86	8-84496D03	.01 uF ±10 %; 250 V
C88	23-84665F04	1 uF +150-0%; 35 V
C89	21-82610C47	57; 100 V
C90	21-82450B26	0.3 ±10%
C91	23-84538G04	15 uF
C92	21-83406D76	3.9 ±0.25 pF; NP0
C94	23-84665F03	100 uF; 50 V
C95	23-84665F06	220 uF; 25 V
C101	21-83596E10	220 ±20%
C102, 103	8-82905G08	.033 uF ±10%; 50 V
C104, 105	21-83596E10	220 ±20%
C106	8-82905G10	.015 uF ±10%; 50 V
C107	21-82428B15	.005 uF
C108	8-82905G21	.018 uF ±10%; 100 V
C109	21-82187B18	.0015 uF ±10%
C110	23-84665F04	1 uF +150-0%; 65 V
C111	21-850510	470 ±10%; 300 V
C112 (M)	21-82204B51	62; N330
C112 (H)	21-82610C21	62; N220
C113	21-84494B52	91
C114	21-84494B15	300
C115, 116	21-82428B59	.01 uF +80-20%; 200 V
C117 (M)	21-82133G39	36; N150
C117 (H)	21-82133G75	30; N150
C118	21-82450B29	.51
C119 (M)	21-83406D18	47
C119 (H)	21-82133G39	36
C120	21-82204B54	100
C121	21-82187B20	.001 uF ±10%; 100 V
C122	21-82450B10	4.3
C123	21-83596E10	220 ±20%
C124, 125, 126	21-82428B59	.01 uF +80-20%; 200 V
C127 (M)	21-82610C03	47
C127 (H)	21-83406D42	43
C128 (M)	21-82204B54	150
C128 (H)	21-82610C44	100
C129	21-83596E10	220 ±20%
C130	21-84538G04	15 uF
C131 (M)	21-82133G22	8 ±.5 pF; NP0
C131 (H)	21-82133G26	6 ±.5 pF; NP0
C132	21-83596E10	220 ±20%
C133	21-82450B29	.51
C134 (M)	21-82133G21	10 ±.5 pF; NP0
C134 (H)	21-82133G22	8 ±.5 pF; NP0
C135	21-82133G41	4.7 ±.25 pF; NP0
C136	21-82204B06	100 ±10%; N1500
C137	21-82372C04	.05 uF +80-20% 25 V
C138 (M)	21-83406D69	30
C138 (H)	21-83406D81	20
C139	20-83201B02	var: 8-60 pF
C140	21-84494B32	20
C141	21-83596E10	220 ±20%
C142	23-84665F01	10 uF +100-[illegible] 35 V
C143	23-84465F04	1 uF +150-0% 35 V
C144	21-850510	470 ±10%; 300 V
C145 (M)	21-82204B51	62; N330
C145 (H)	21-82610C21	62; N220
C146	21-84494B52	91
C147	21-84494B15	300
C148	21-82428B59	.01 uF +80-20%; 200 V
C150	21-83596E10	220 ±20%
C151	21-82372C04	.05 uF +80-20%; 25 V
C152	21-83596E10	220 ±20%
C153 (M, A)	21-83406D70	4 ±.25; NP0
C153 (H, A)	21-83406D84	6.8; NP0
C155	21-83596E10	220 ±20%
C156	21-82372C04	.05 uF +80-20% 25 V
C250 (M, A)	20-83201B03	var: 20-115
C250 (H, A)	20-83201B02	var: 8-60
C250 (B)	20-83201B02	var: 8-60
C251	21-83596E10	220 ±20%
C252	21-82372C04	.05 uF +80-20% 25 V
C253 (A)	21-84494B36	15
C253 (B)	21-807-44	4 ±.5
C254	20-83201B02	var: 8-60 pF

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
C255 (M)	21-83406D79	18; N150
C255 (H)	21-83406D97	15; NP0
C256 (M)	21-83406D82	36; NP0
C256 (H)	21-83406D69	30; NP0
C257 (M)	21-83406D71	33; NP0
C257 (H)	21-83406D68	27; NP0
C258 (M)	21-83406D79	18; N150
C258 (H)	21-83406D97	15; NP0
C259	21-83406D79	18; N150
C260	21-82204B06	100 ±10%; 500 V
C261	21-83406D79	18; N150
C262	23-84538G04	15 uF
C263 (A)	21-887845	3 ±.5%
C263 (B)		NOT USED
		DIODE: (SEE NOTE 1)
CR1, 2	48-83510F03	silicon; PIN type (2-freq. only)
CR3, 4, 5, 8, 9	48-83654H01	silicon
CR7	48-82466H13	silicon
CR101	48-82190H13	varactor
CR102	48-82190H13	varactor; (2-freq. only)
CR103, 106, 107	48-83654H01	silicon
CR104	48-83654H01	silicon; (2-freq. only)
CR105	48-82139G01	germanium
CR250	48-83510F04	silicon
		LAMP:
DS601, 602	65-83376K01	type GE#73; 14 V
		FUSE:
F601	65-20404	3 A; 250 V (10-watt models)
	or 65-86099	7 A; 32 V (25-watt models)
		CONNECTOR, receptacle:
J601		includes: 15-83292K01 SHELL; 29-84706E06 TERMINAL, female, 4 req'd.
J602	9-82442E09	female, single contact
		COIL, RF:
L10, 12, 13	24-84972A11	3-1/2 turns; coded BLK
L11	24-84972A01	2-1/2 turns; coded BLK
L14	24-84419D02	22-1/2 turns
L15, 16	24-84419D03	33-1/2 turns
L17	24-82549D25	10 uH
L18	24-84419D04	22-1/2 turns
L19	24-82835G20	9.3 uH
L20	24-82723H04	0.29 uH
L21, 22	24-82723H07	10 uH; (2-freq. only)
L23	24-82835G08	choke; 2.6 uH
L60	24-84972A14	4-1/2 turns; coded RED
L61	24-83601K01	18-1/2 turns; coded WHT (25 W only)
	or 24-84922C09	21-1/2 turns (10 watt only)
L62	24-83601K01	18-1/2 turns; coded WHT (2-freq. only)
L63	24-82723H03	choke; 23 uH
L101	24-83601K01	18-1/2 turns
L102	24-84972A06	8-1/2 turns; coded ORG
L103	24-84972A04	8-1/2 turns; coded WHT
L104	24-82835G13	0.82 uH
L105	24-84972A05	8-1/2 turns; coded RED
L106	24-82835G13	0.82 uH
L107	24-84972A26	3-1/2 turns; coded BLU
L108	24-84972A11	3-1/2 turns
L109	24-800484	0.31 uH
L110 (A)	24-83884G01	3-1/2 turns
L110 (M, B)	24-83884G07	2-1/2 turns; coded GRN
L110 (H, B)	24-83884G03	1-1/2 turns; coded BRN
L112	24-800484	0.31 uH
L113 (M, A)	24-83884G07	2-1/2 turns; coded GRN
L113 (H, A)	24-83884G03	1-1/2 turns; coded BRN
L113 (M, B)	24-83884G03	1-1/2 turns; coded BRN
L113 (H, B)	10-000519	wire; solid
L114	24-83601K01	18-1/2 turns (2-freq. only)
L115 (A)		NOT USED
L115 (B)	24-83961B01	3 turns; coded BRN
L250	24-83977B01	1-1/2 turns
L251 (A)	24-84346A02	choke; 230 mH
L251 (B)	24-824998	choke; 153 mH
L252 (A)	24-83884G06	4-1/2 turns; coded WHT
L252 (B)	24-83884G03	1-1/2 turns; coded BRN
L253 (A)	24-83884G04	7-1/2 turns; coded YEL

REFERENCE SYMBOL	MOTOROLA PART NO.	
L253 (B)	24-83884G09	6-1/2 t
L254 (M), 255 (M), 256 (M)	24-83884G09	6-1/2 t
L254 (H), 255 (H), 256 (H), 257	24-83884G08	5-1/2 t
		SPEAK
LS601	50-83291K01	3-1/2 i
		CONNE
P601		include 29-847 male
		TRANS
Q1	48-869940	field-ef
Q2	48-869943	field-ef
Q3, 4	48-869494	NPN; ty
Q5	48-869571	PNP; ty
Q6, 7, 8	48-869642	NPN; ty
Q9	48-869494	NPN; ty
Q10	48-869643	PNP; ty
Q11	48-869642	NPN; ty
Q100	48-869643	PNP; ty
Q101, 102	48-869642	NPN; ty
Q103, 104, 105	48-869494	NPN; ty
Q105 (A)	48-869494	NPN; ty
Q105 (B)	48-869638	NPN; ty
Q106	48-869657	NPN; ty
Q107	48-869859	NPN; ty
Q108	48-869494	NPN; ty
Q109	48-869643	PNP; ty
Q110 (A)	48-869649	NPN; ty
Q110 (B)	48-869641	NPN; ty
Q111, 112	48-869643	PNP; ty
Q113	48-869640	NPN; ty
Q250 (A)	48-869860	NPN; ty
Q250 (B)	48-869958	NPN; ty
		RESIST
		unless
R1, 2	6-125A25	100 ±5%
R10	6-124C41	470
R11	6-124C57	2.2k
R12	6-124C79	18k
R13	6-124C47	820
R14	6-124C79	18k
R15	6-124C83	27k
R17	6-124C47	820
R18, 19	6-124C61	3.3k
R21	6-124C47	820
R22	6-124A17	47 ±5%
R23	6-124D06	220k
R25	6-124C59	2.7k
R26	6-124A67	5.6k ±5%
R28	6-124C25	100
R29	6-124C17	47
R30	6-125D70	1 ±10%;
R31	6-124C83	27k
R34	6-124A69	6.8k ±5%
R35	6-124C25	100
R36	6-124A39	390 ±5%
R37	6-124C13	33
R39	6-124C85	33k
R60	6-124C61	3.3k (2-
	or 6-124C63	3.9k (1-
R61	6-124C61	3.3k (2-
R62	6-124C39	390
R63	6-124A73	10k ±5%
R65	6-124C73	10k
R66	6-124A49	1k ±5%
R67	6-124C45	680
R68	6-124C45	680 (2-f
R69, 70	6-124C89	47k (2-f
R81	6-124B24	1.2 M ±5
R82	6-124C41	470
R83	6-124A43	560 ±5%
R84	6-124A83	27k ±5%
R85	6-124A79	18k ±5%
R86	6-124A89	47k ±5%







DESCRIPTION
urns; coded BLU
urns; coded BLU
urns; coded ORG
ER:
nch; 4 ohms
CTOR, plug:
s: 15-83293K01 SHELL;
6E05 TERMINALS,
STOR: (SEE NOTE I)
fect; type M9940
fect; type M9943
pe M9494
pe M9571
pe M9642
pe M9494
pe M9643
pe M9642
pe M9643
pe M9642
pe M9494
pe M9494
pe M9638
pe M9657
pe M9859
pe M9494
pe M9643
pe M9649
pe M9641
pe M9643
pe M9640
pe M9860
pe M9958
OR, fixed: ±10%; 1/4 W;
therwise stated
1/2 W
%
1/2 W
freq. only)
freq. only)
freq. only)
eq. only)
eq. only)
%

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R87	6-124C77	15k
R90	6-124A78	16k ±5%
R91	6-124A92	62k ±5%
R92	6-124A43	560 ±5%
R93	6-124C57	2.2k
R94	6-124C67	5.6k ±5%
R95	6-124C89	47k
R96	6-124A11	27 ±5%
R97	6-124C51	1.2k
R101	6-124C47	820
R102	6-124A83	27k ±5%
R103	6-124A93	68k ±5%
R104	6-124A83	27k ±5%
R105	6-124A93	68k ±5%
R106	6-124A26	110 ±5%
R108	6-124A57	2.2k ±5%
R109, 110	6-124A67	5.6k ±5%
R111	6-124A69	6.8k ±5%
R112	6-124A73	10k ±5%
R113	6-124A71	8.2k ±5%
R114	6-124C59	2.7k ±10%
R115	18-84944C02	var; 25k ±5%
R116	6-124C67	5.6k ±10%
R117	6-124B02	150k ±5%
R118	6-124B04	180k ±5%
R119	6-124A65	4.7k ±5%
R120	6-124A75	12k ±5%
R121	6-124A49	1k ±5%
R122	6-124A67	5.6k ±5%
R123	6-124A73	10k ±5%
R124	6-124A19	56 ±5%
R125	6-124C37	330 ±10%
R126	6-124C33	220 ±10%
R127 (A)	6-124C33	220 ±10%
R127 (B)	6-124A29	150 ±5%
R128	6-124A27	120 ±5%
R129	6-124C63	3.9k ±10%
R130	6-124C25	100 ±10%
R131	18-84944C02	var; 25k
R132	6-124C67	5.6k ±10%; (2-freq. only)
R133	6-124B02	150k; (2-freq. only)
R134	6-124B04	180k; (2-freq. only)
R135	6-124A65	4.7k; (2-freq. only)
R136	6-124C75	12k ±10%; (2-freq. only)
R137	6-124A49	1k; (2-freq. only)
R138 (A)	6-124C17	47
R138 (B)	6-124C01	10
R139	6-124D61	4.7
R140	18-84944C04	variable; 500
R141	6-124C35	270
R142	6-125C29	150; 1/2 W
R143	6-125C47	820; 1/2 W
R144	6-124A53	1.5k ±5%
R145 (A)	17-82036G48	0.1 ±5%; 2 W
R145 (B)	17-82036G49	0.05 ±5%; 2 W
R146	6-124A59	2.7k ±5%
R147	6-124C49	1k
R148, 149	6-124A69	6.8k ±5%
R150	6-124C49	1k
R151	6-124A26	110 ±5%
R152	6-124C01	10
R153	6-125A25	100 ±5%; 1/2 W
R154	6-124A85	33k ±5%
R155	6-125C53	1.5k
R156	6-125A25	100 ±5%; 1/2 W
R157 (M, B)	6-124C41	470
R157 (H, B)	6-124C45	680
R158 (A)		NOT USED
R158 (B)	6-124C45	680
R250 (A)	6-124C25	100
R250 (B)		NOT USED
R251	6-125C47	820; 1/2 W
R252	6-124C63	3.9k
R253	6-124D55	2.7
R254 (A)	6-125C07	18; 1/2 W
R254 (B)	6-124C17	47
R255	6-124C17	47
R601	18-83288K01	var; 100k; 30% @ 1/2 rotation
R602	18-83287K01	var; 100k
R603	17-82036G13	fixed: 0.75; 2 W
		THERMISTOR:
RT101	6-83600K01	1k @ 25°C

REFERENCE SYMBOL
S601
S603
U1
U2
VR1
VR2
VR101
XF601
Y1, 2
Y3
Y4
Y5
Y101, 102
NON-
NON
NON-REF
OT

NOTES:

I. [illegible]

II. [illegible]

MOTOROLA PART NO.	DESCRIPTION
	SWITCH ASSEMBLY:
	P/O R601
0-8329K02	1 dpdt (2-freq. only)
	INTEGRATED CIRCUIT:
	(SEE NOTE I)
1-84320A78	type M2078
1-84320A77	type M2077
	VOLTAGE REGULATOR:
8-82256C56	Zener type, 8.8 V
8-82256C50	Zener type, 13 V
8-82256C56	Zener type, 8.8 V
	FUSEHOLDER:
4-82882A01	BODY, fuseholder
4-82883A01	CAP, fuseholder
9-84706E05	PIN, male; 4 req'd.
1-82885A01	SPRING, fuseholder
2-82884A01	CLIP, fuse; 2 req'd.
	CRYSTAL: (SEE NOTE II)
XN6122AA	46.700-54.433 MHz
	(1 & 2-freq.)
8-84396K03	IF; 10.7 MHz
8-84396K04	IF; 10.7 MHz
8-84396K03	IF; 10.7 MHz
XN6121AA	16.7555-19.3333 MHz
REFERENCED ITEMS (RECEIVER)	
-83487K01	SOCKET, crystal (used on Y1 and Y2)
4-84602K01	INSULATOR, crystal (used on Y3, Y4, and Y5)
6-83264F01	SHIELD, coil
6-84598A01	SHIELD, coil; large hole (for RF & OSC coil)
6-84598A02	SHIELD, coil; small hole (for IF coil)
6-82570L01	HEATSINK: 1.20 x .90" (used with U2)
6-82571L01	HEATSINK: .59 x .32" (used with U2)
REFERENCED ITEMS (EXCITER)	
-83487K01	SOCKET, for Y101, Y102
6-84598A01	SHIELD, coil
6-83960B01	FERRITE BEAD
RENCED ITEMS (POWER AMPLIFIER)	
6-84716D01	HEATSINK
6-83578L01	HEATSINK (20 W models only)
IER NON-REFERENCED ITEMS	
-83396K02	SOCKET, lamp; for DS601
-83396K03	SOCKET, lamp; for DS602
8-83138K02	BUTTON, push; ORG
5-83128K03	HOUSING
3-84126L01	NAME PLATE
3-84253L02	NAME PLATE, FCC
6-83132K02	KNOB, control

m performance, diodes, transistors, and circuits must be ordered by Motorola part

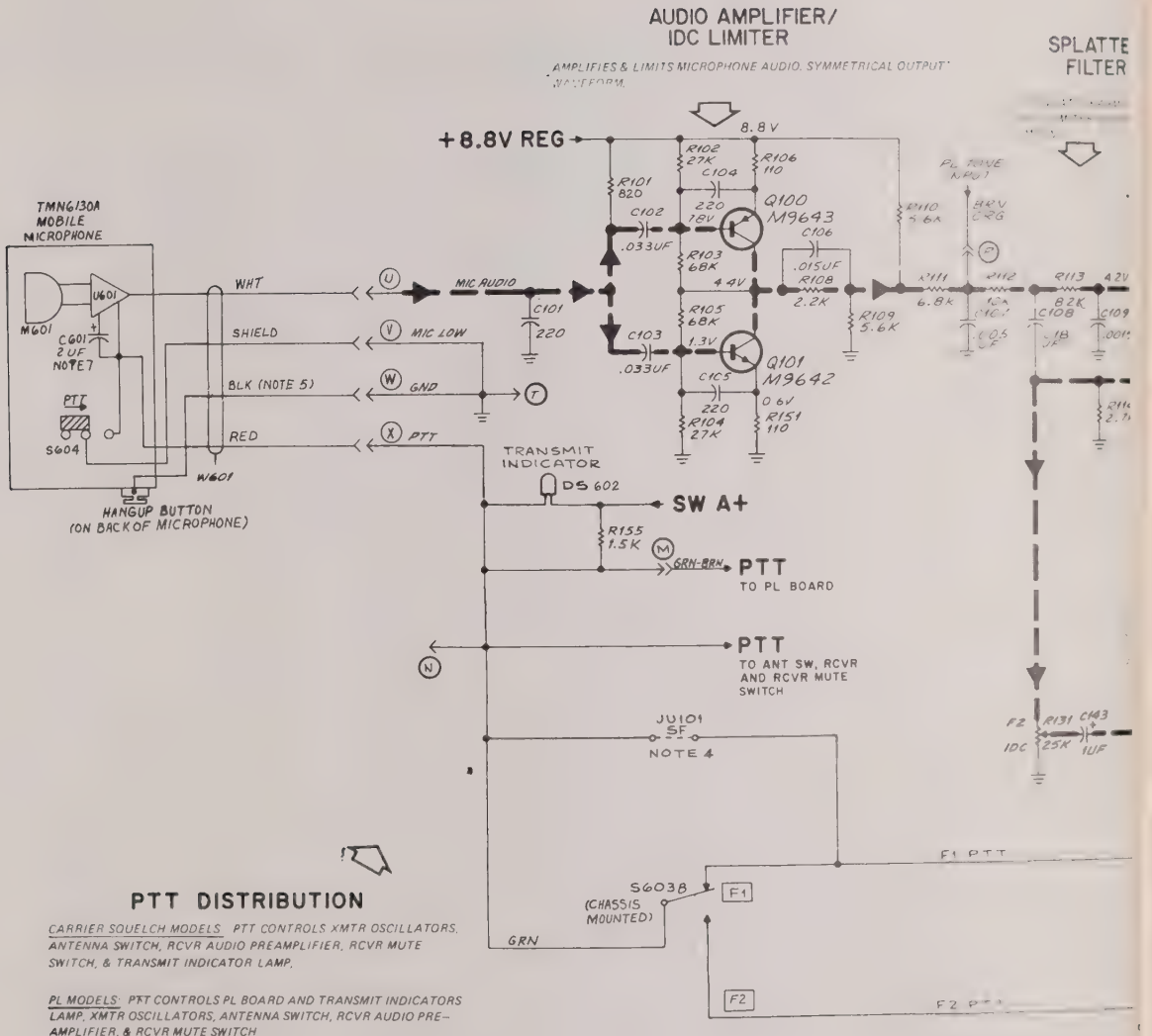
ing quartz crystal units or ceramic resonators, rier frequency, crystal (or resonator) frequency (or resonator) type number.

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

PARTS LIST

TMN6130A Microphone PL-5333-O

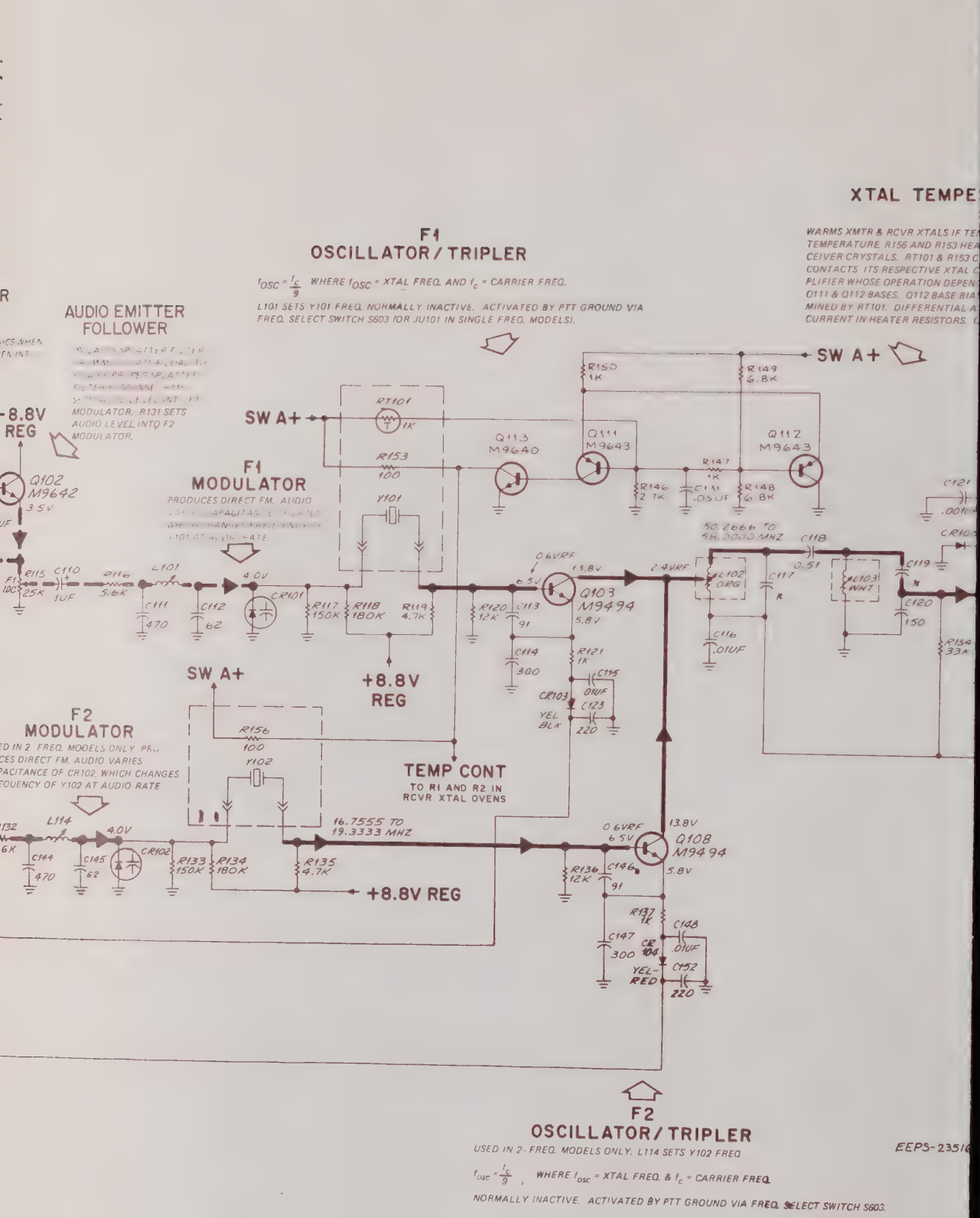
C601	23-84669A27	CAPACITOR, fixed: 2 uF
S604	40-84622B07	SWITCH, slide: dpdt
U601	51-84333G79	HYBRID CIRCUIT: hybrid preamplifier
W601	30-83586L01	CORD, microphone; coiled: 4 conductor; includes 39-10184A24 TERMINAL PIN (4 req'd.) female 29-83277G02 LUG (4 req'd.) 41-83576L01 SPRING, strain relief
NON-REFERENCED ITEMS		
	50-83905L01	DYNAMIC CARTRIDGE
	33-83577L01	NAMEPLATE
	33-83574L01	PUSHBUTTON
	3-139797	SCREWS, tapping; #5-20 x 5/8"; 3 req'd.
	4-001725	WASHER, flat
	4-82707B01	WASHER, flat
	5-855939	RIVET, shoulder
	15-83572L01	HOUSING, back
	15-83573L01	HOUSING, front
	29-005247	LUG
	35-83575L01	GRILL CLOTH

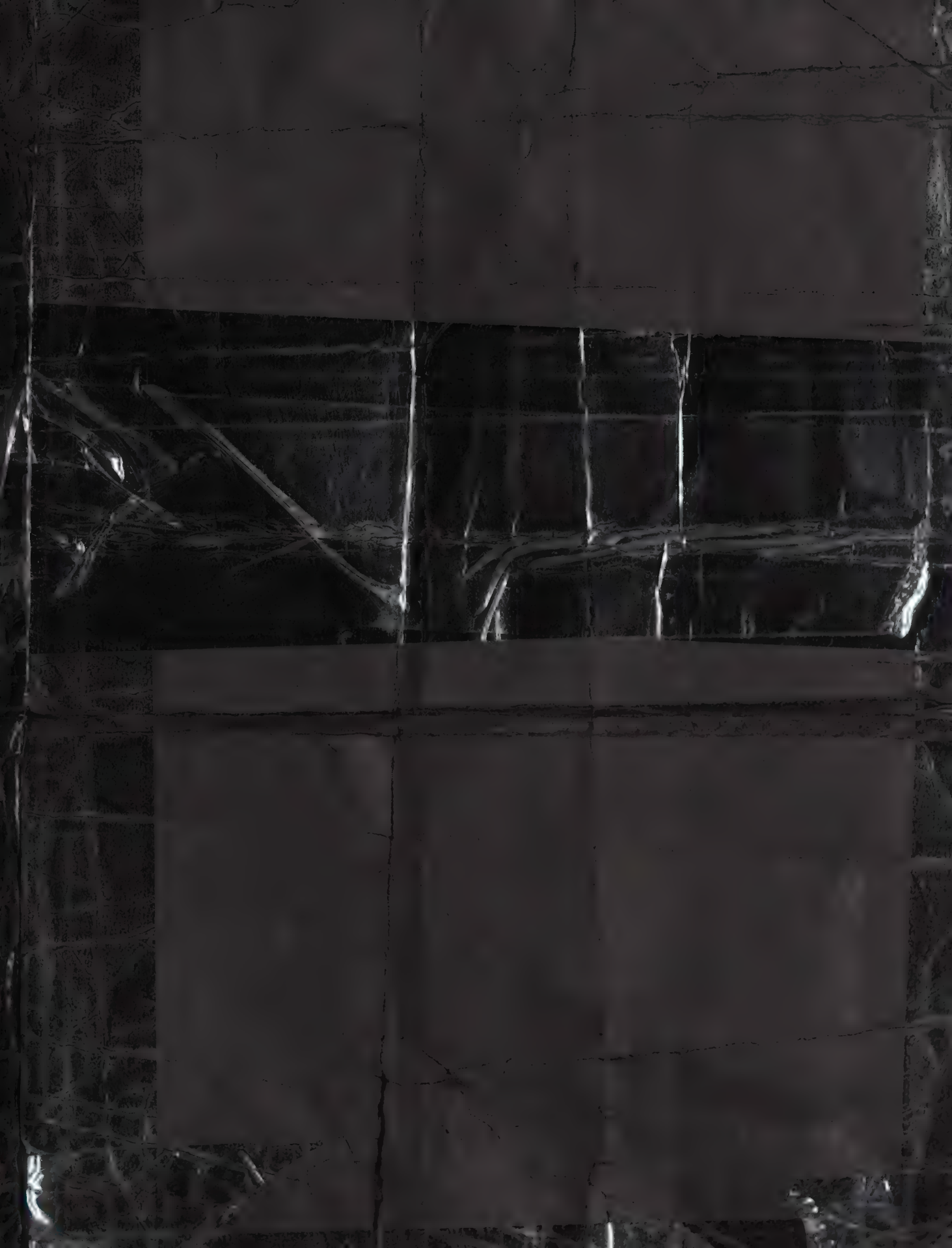


PTT DISTRIBUTION

CARRIER SQUELCH MODELS: PTT CONTROLS XMTR OSCILLATORS, ANTENNA SWITCH, RCVR AUDIO PREAMPLIFIER, RCVR MUTE SWITCH, & TRANSMIT INDICATOR LAMP.

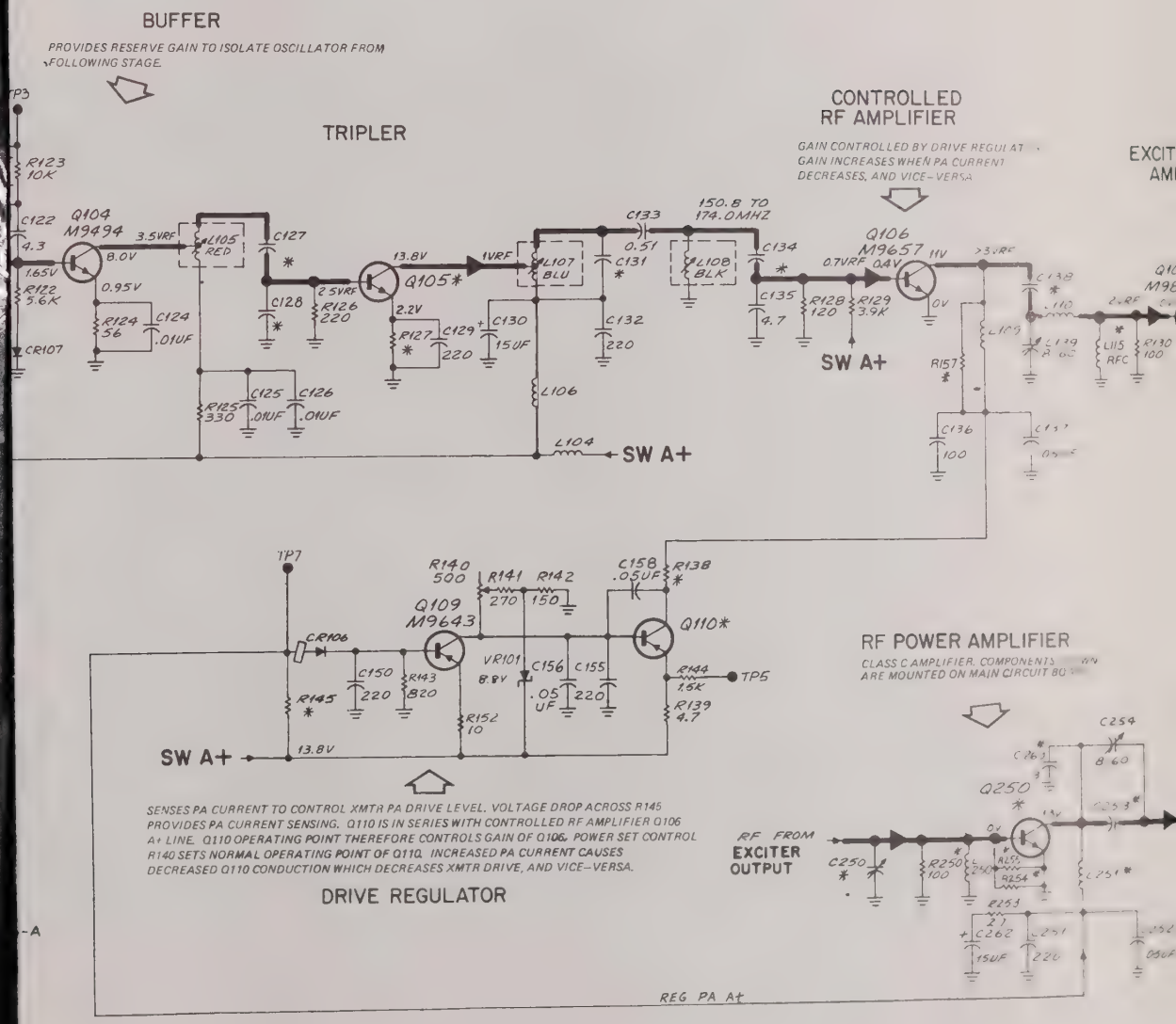
PL MODELS: PTT CONTROLS PL BOARD AND TRANSMIT INDICATORS LAMP, XMTR OSCILLATORS, ANTENNA SWITCH, RCVR AUDIO PRE-AMPLIFIER, & RCVR MUTE SWITCH


XTAL TEMPE
WARMS XMTR & RCVR XTALS IF TE
TEMPERATURE. R156 AND R153 HEA
CEIVER CRYSTALS. RT101 & R153 C
CONTACTS ITS RESPECTIVE XTAL C
PLIFIER WHOSE OPERATION DEPEN
Q111 & Q112 BASES. Q112 BASE BIA
MINED BY RT101. DIFFERENTIAL A
CURRENT IN HEATER RESISTORS.
F1
OSCILLATOR / TRIPLER
$f_{OSC} = \frac{f_c}{9}$ WHERE f_{OSC} = XTAL FREQ. AND f_c = CARRIER FREQ.
L101 SETS Y101 FREQ. NORMALLY INACTIVE. ACTIVATED BY PTT GROUND VIA FREQ. SELECT SWITCH S603 (OR JU101 IN SINGLE FREQ. MODELS).
AUDIO EMITTER FOLLOWER
MODULATOR. R131 SETS AUDIO LEVEL INTO F2 MODULATOR.
-8.8V REG
Q102 M9642
3.5V
SW A+
RT101
1K
R153
100
Y101
F1 MODULATOR
PRODUCES DIRECT FM. AUDIO
R150 1K
R149 6.8K
Q113 M9640
Q111 M9643
Q112 M9643
R147 1K
R146 2.7K
C131 .05UF
R148 6.8K
C121
.001
50.2666 TO 58.0000 MHZ
C118 0.51
C119
C120 150
R154 33K
R115 25K
C110 1UF
R116 5.6K
L101
C111 470
C112 62
4.0V
CR101
R117 150K
R118 180K
R119 4.7K
R120 12K
C113 91
C114 300
0.6VRF
6.5V
13.8V
Q103 M9494
5.8V
2.4VRF
L102 ORG
C117
L103 WHT
C116 .01UF
R121 1K
C115 .01UF
CR103
YEL BLK
C123 220
+8.8V REG
SW A+
F2 MODULATOR
ED IN 2 FREQ. MODELS ONLY PRO
CES DIRECT FM. AUDIO VARIES
PACITANCE OF CR102, WHICH CHANGES
EQUENCY OF Y102 AT AUDIO RATE
R156 100
Y102
TEMP CONT
TO R1 AND R2 IN RCVR XTAL OVENS
L114
4.0V
C144 470
C145 62
CR102
R133 150K
R134 180K
R135 4.7K
16.7555 TO 19.3333 MHZ
+8.8V REG
0.6VRF
6.5V
13.8V
Q108 M9494
5.8V
R136 12K
C146 91
R137 1K
C148 .01UF
C147 300
CR104
YEL-RED
C152 220
F2
OSCILLATOR / TRIPLER
USED IN 2-FREQ. MODELS ONLY. L114 SETS Y102 FREQ
$f_{OSC} = \frac{f_c}{9}$, WHERE f_{OSC} = XTAL FREQ. & f_c = CARRIER FREQ.
NORMALLY INACTIVE. ACTIVATED BY PTT GROUND VIA FREQ. SELECT SWITCH S603.
EEPS-2351



RATURE REGULATOR

MPERATURE IS BELOW −10°C. RT101 SENSES XTAL
T TRANSMITTER XTALS. R1 AND R2 HEAT RE−
ONTACT Y101 CASE & EACH HEATER RESISTOR
ASE. Q111 & Q112 FORM A DIFFERENTIAL AM−
DS ON THE VOLTAGE DIFFERENCE BETWEEN
T IS REFERENCE & Q111 BASE BIAS IS DETER−
MPLIFIER CONTROLS Q113, WHICH CONTROLS
113 IS OFF AT TEMPERATURES ABOVE −10°C.



NOTES

1 COMPONENTS MARKED WITH AN ASTERISK MAY HAVE DIFFERENT VALUES (OR TYPE NUMBERS) ON DIFFERENT RADIO MODELS, OR MAY BE OMITTED ON SOME MODELS. SEE UNIFIED CHASSIS PARTS LIST.

THE FOLLOWING PARTS ARE OMITTED ON 10 WATT MODELS: L115, L157, R156, R255.

THE FOLLOWING PARTS ARE OMITTED ON 20 WATT MODELS: C151, C261, R250.

2 UNLESS OTHERWISE NOTED: RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES ARE IN PICOFARADS.

3 UNLESS OTHERWISE NOTED, DC VOLTAGES ARE MEASURED WITH A 20,000 OHM PER VOLT METER AND RF VOLTAGES ARE MEASURED WITH AN RF VOLTMETER.

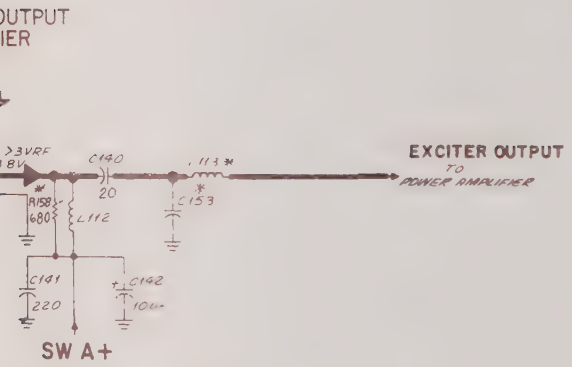
4 JUMPER CONNECTIONS ARE SHOWN IN THE FOLLOWING TABLE

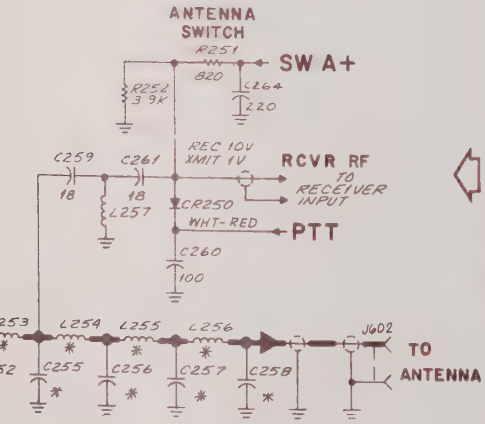
JUMPER NUMBER	IN	
JU1	SINGLE FREQUENCY RECEIVER MODELS	TW
JU2	CARRIER SQUELCH AND DIGITAL PRIVATE LINE MODELS	TW
JU3	SINGLE FREQUENCY RECEIVER MODELS	TW
JU101	SINGLE FREQUENCY TRANSMITTER MODELS	TW
JU601	ALL MODELS	PTT

5 IN CARRIER SQUELCH MODELS, THE BLACK MICROPHONE WIRE IS CONNECTED TO PUSH-PIN W IN PL AND DPL MODELS, THE BLACK WIRE IS CONNECTED TO THE ORG-RED WIRE IN THE PL OR DPL BOARD USING AN IN-LINE CONNECTOR. SEE PL OR DPL SCHEMATIC DIAGRAM FOR APPROPRIATE CONNECTION DETAILS.

6 CONNECTIONS ARE SHOWN FOR MODEL TMN6130A MOBILE MICROPHONE. FOR DESK MICROPHONE CONNECTIONS SEE SECTION 68P81030E06. CONNECTION INFORMATION FOR THE OPTIONAL HANDSET WITH HANGUP BOX IS PROVIDED WITH THE HANDSET OPTION.

7 CAPACITOR C601 IN THE MOBILE MICROPHONE IS PHYSICALLY MOUNTED ON UNUSED CONTACTS OF PTT SWITCH.





ANTENNA SWITCH ISOLATES RCVR INPUT DURING TRANSMISSION
NETWORK C259–L257–C261= 1/4 WAVE TRANSMISSION LINE
CR250 AT OUTPUT END

RECEIVE: PTT UNGROUNDED. CR250 NONCONDUCTING (OPEN CIRCUIT). 1/4 WAVE
PA OUTPUT CIRCUIT IS HIGH IMPEDANCE TO RECEIVED RF. RF PASSES TO RCVR RF

TRANSMIT: PTT GROUNDED. CR250 CONDUCTS (SHORT CIRCUIT)
SHORT AT 1/4 WAVE LINE OUTPUT CAUSES "OPEN" AT LINE INPUT
XMTR RF IS BLOCKED FROM RCVR RF INPUT

ATTENUATES FREQUENCIES ABOVE 162 MHz
(MEDIUM RANGE) OR 174 MHz (HIGH RANGE)

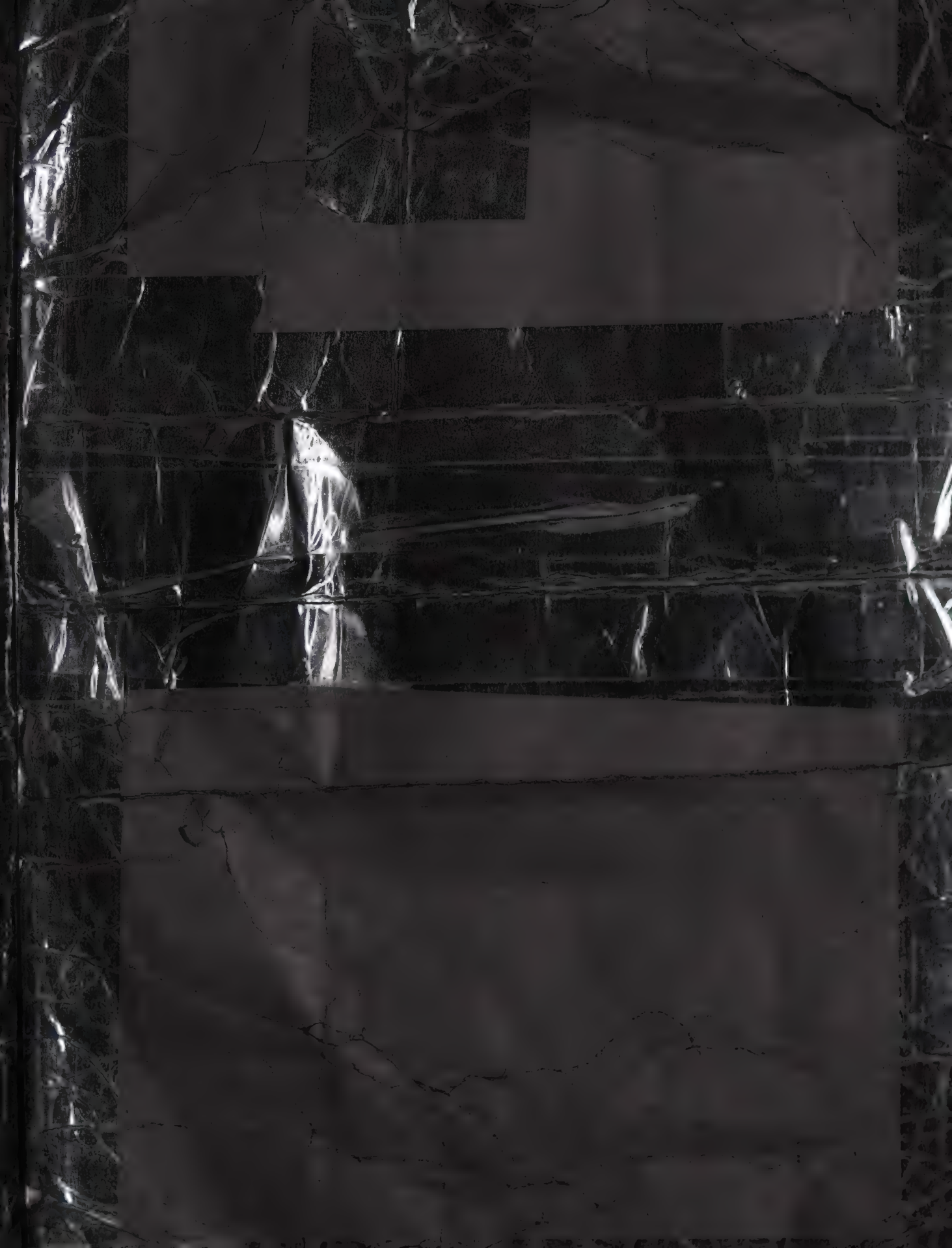
HARMONIC
FILTER

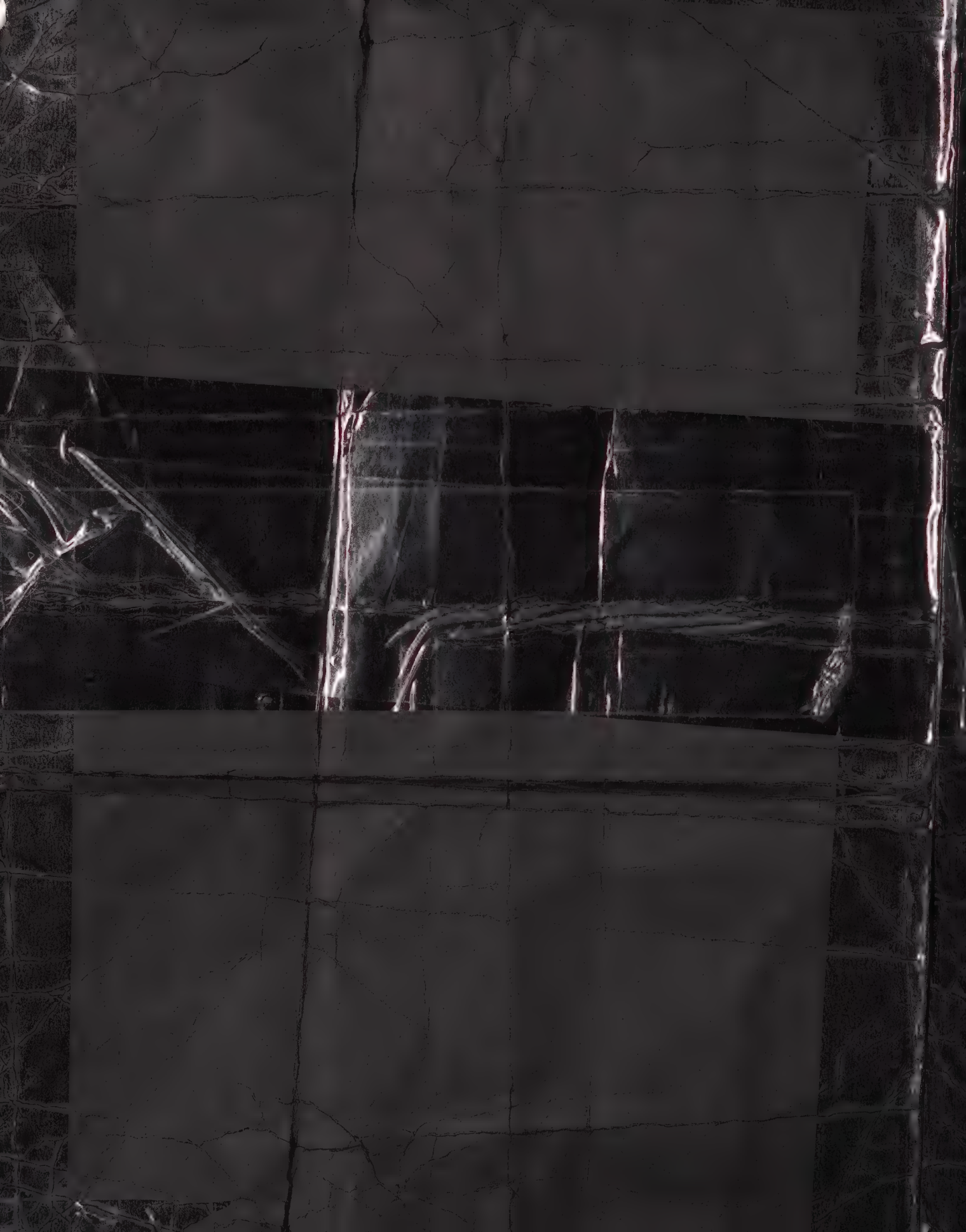
LEGEND

= THEORY OF

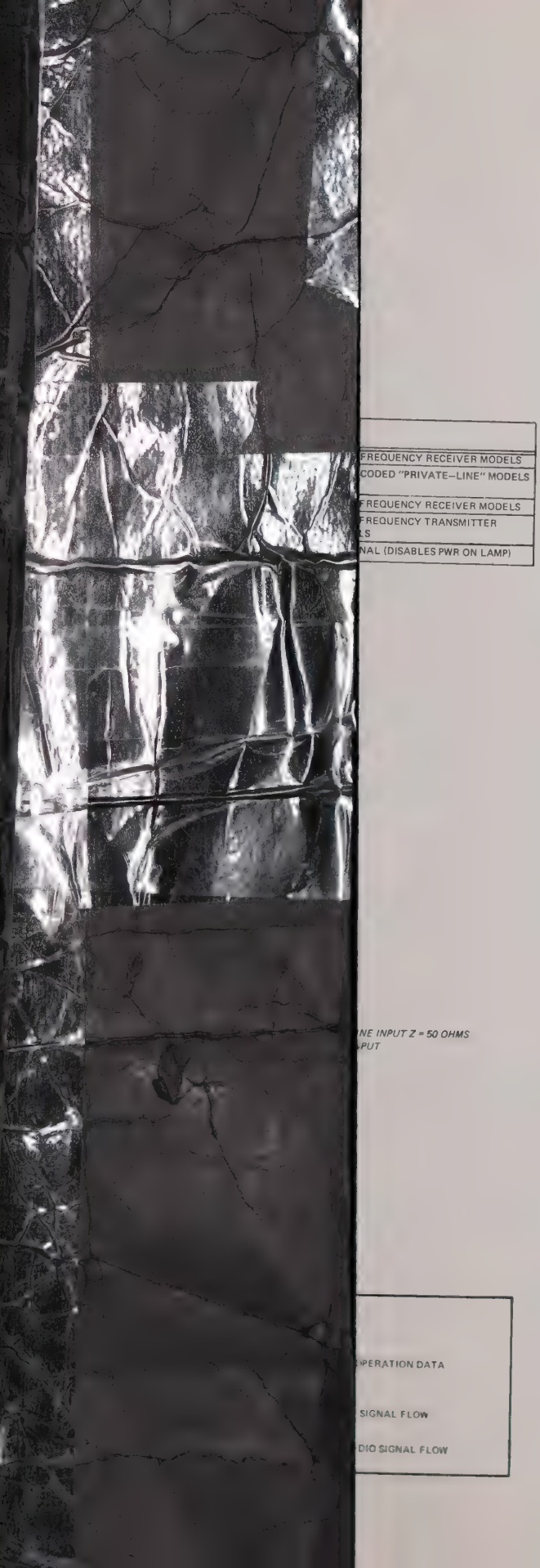
= PRIMARY RF

= PRIMARY AU





UNIFIED CHASSIS EXCITER SECTION



FUNCTION

Amplifies voice signals from the microphone and produces a low-level FM modulated rf signal for the rf power amplifier.

EXCITER

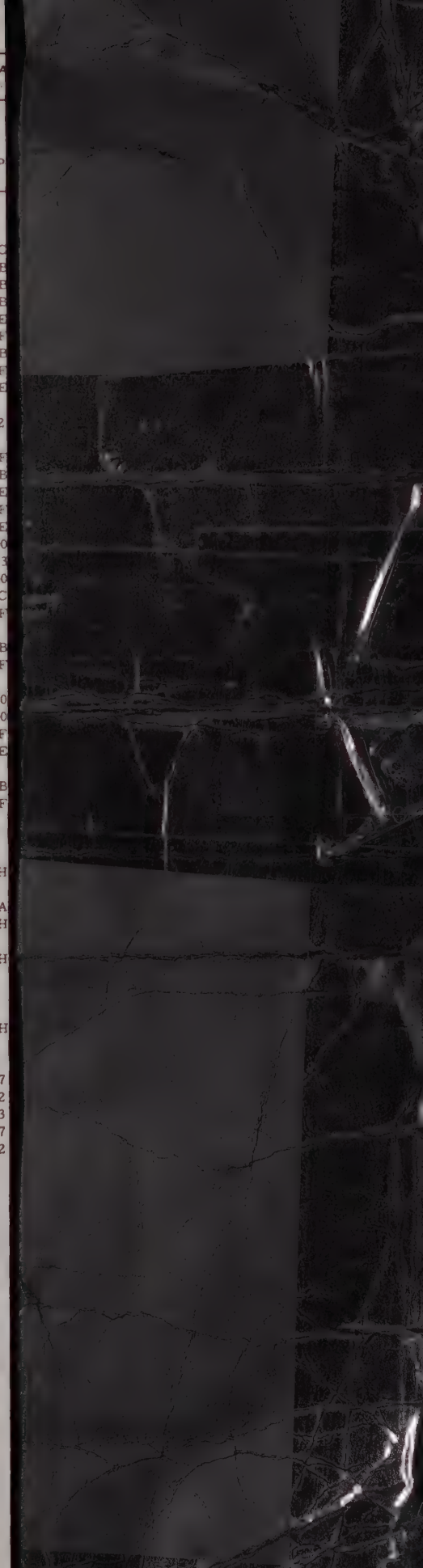
TONE "PRIVATE-LINE" ENCODER/DECODER

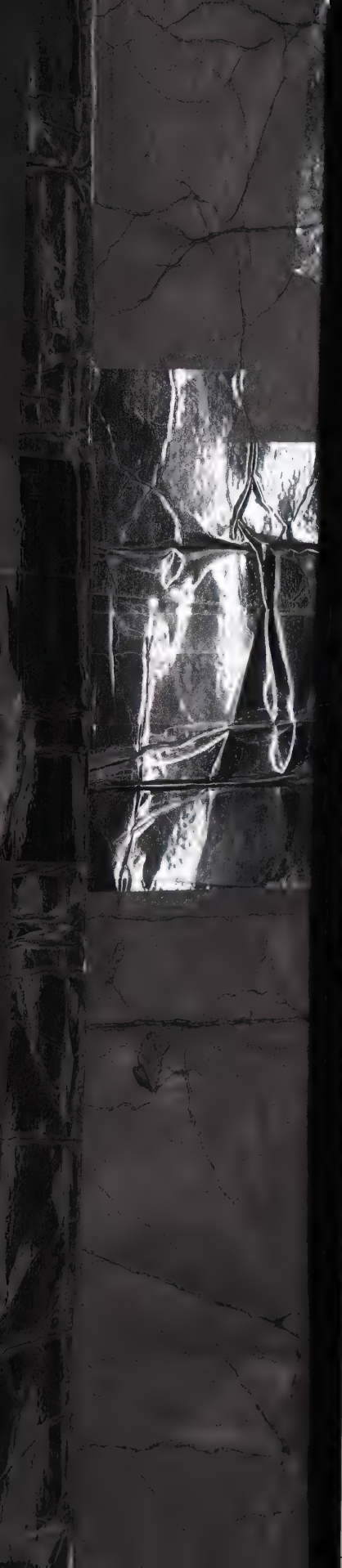
MODEL TRN6904A

PARTS LIST

TRN6904A Tone-Coded "P
Encoder/Decoder

REFERENCE SYMBOL	MOTOROLA PART NO.
C401	21-82372C
C402, 403	21-82428B
C404	21-82428B
C405	21-82428B
C406	21-83596E
C407, 408	23-84665F
C409	21-82428B
C410	23-84665F
C411	21-83596E
C412, 413, 414	
C415	8-82096J2
C416	
C417	23-84665F
C418, 419	21-82428B
C420	21-83596E
C421	23-84665F
C422	21-83596E
C423, 424	8-84496D0
C425	8-82905G3
C426	8-84496D0
C427	21-82372C
C428	23-84665F
C429	
C430	21-82428B
C431	23-84665F
C432, 433	
C434	8-83813H0
C435	8-84496D0
C436	23-84665F
C437	21-83596E
C438	
C439	21-82428B
C440	23-84665F
CR401	
CR402	48-83654H
CR403	
CR404	48-82178A
CR405	48-83654H
CR406	
CR407, 408, 409	48-83654H
L401	25-82498H
Q401, 402	48-134667
Q403 thru 406	48-869642
Q407	48-869643
Q408	48-134667
Q409	48-869642
R401, 402	6-124D02
R403, 404, 405	6-124A99
R406	6-124D02
R407	6-124A99
R408	6-124C49
R409	6-124C69
R410	6-124C63
R411	6-124A99
R412	6-124C85
R413	6-124C55
R414	6-124C37
R415	
R416	6-124C65
R417 thru 420	
R421	6-124C87
R422 thru 427	
R428	6-124C49
R429	6-124C83
R430	6-124C33
R431	6-124C61
R432	6-124C57

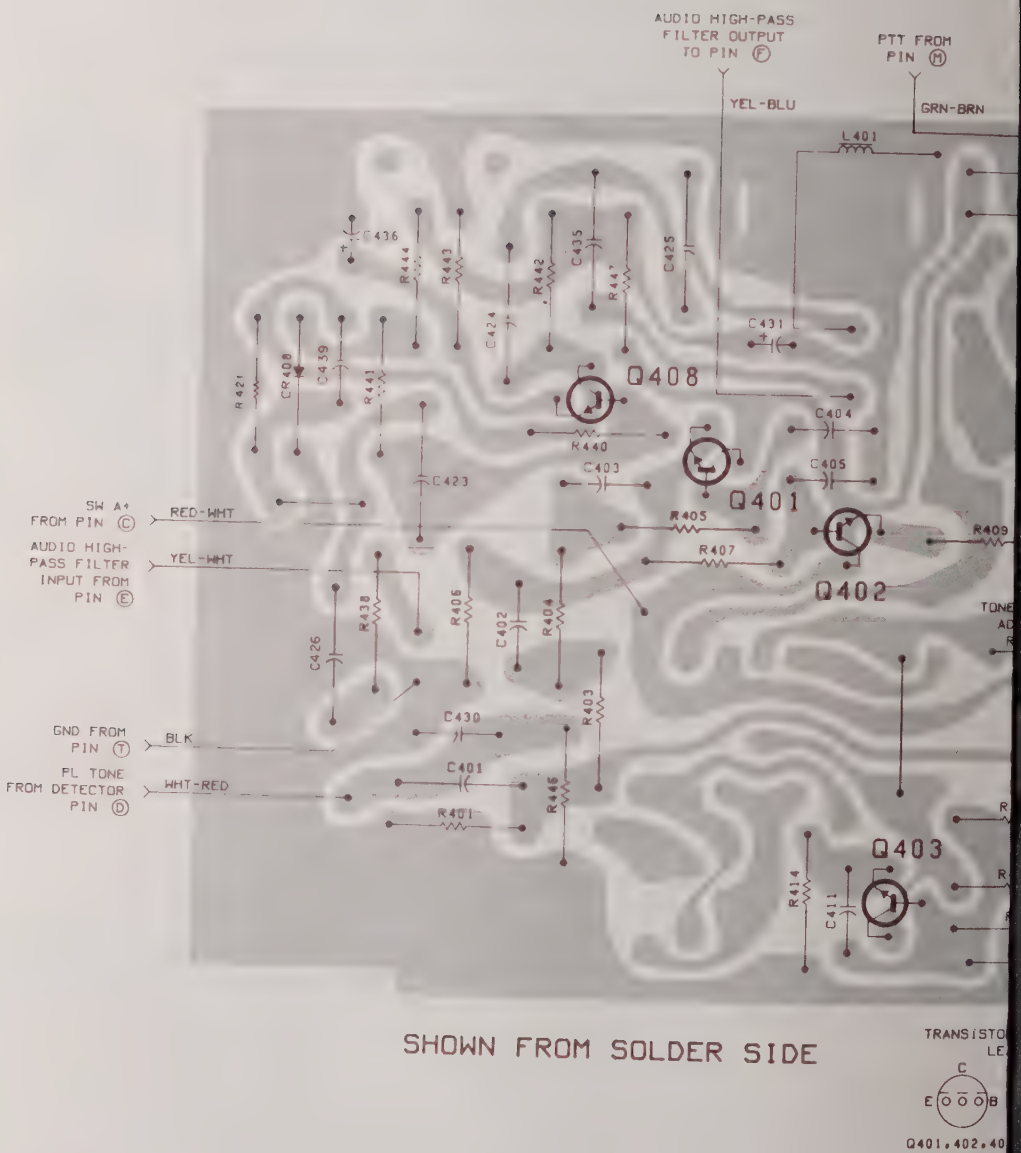


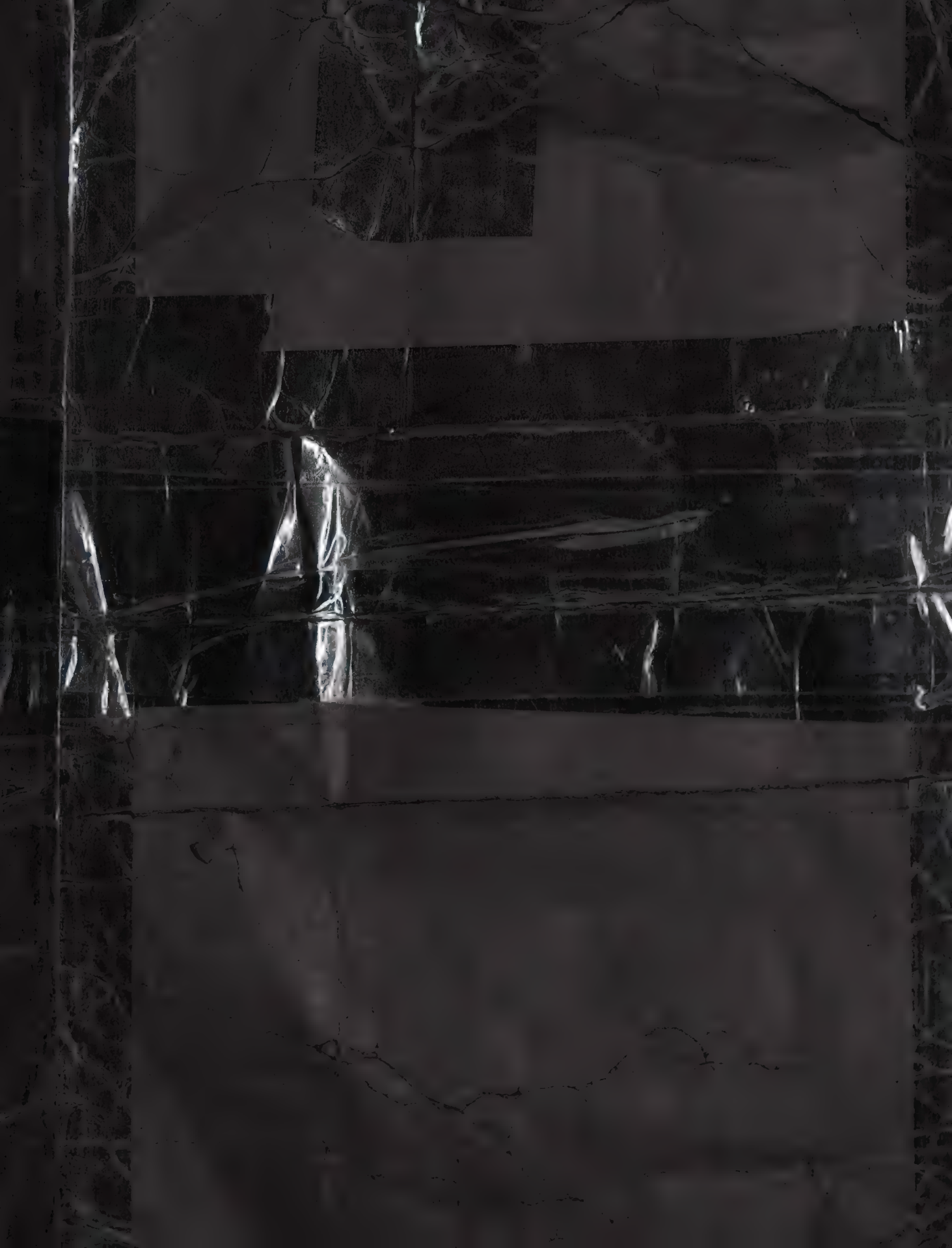


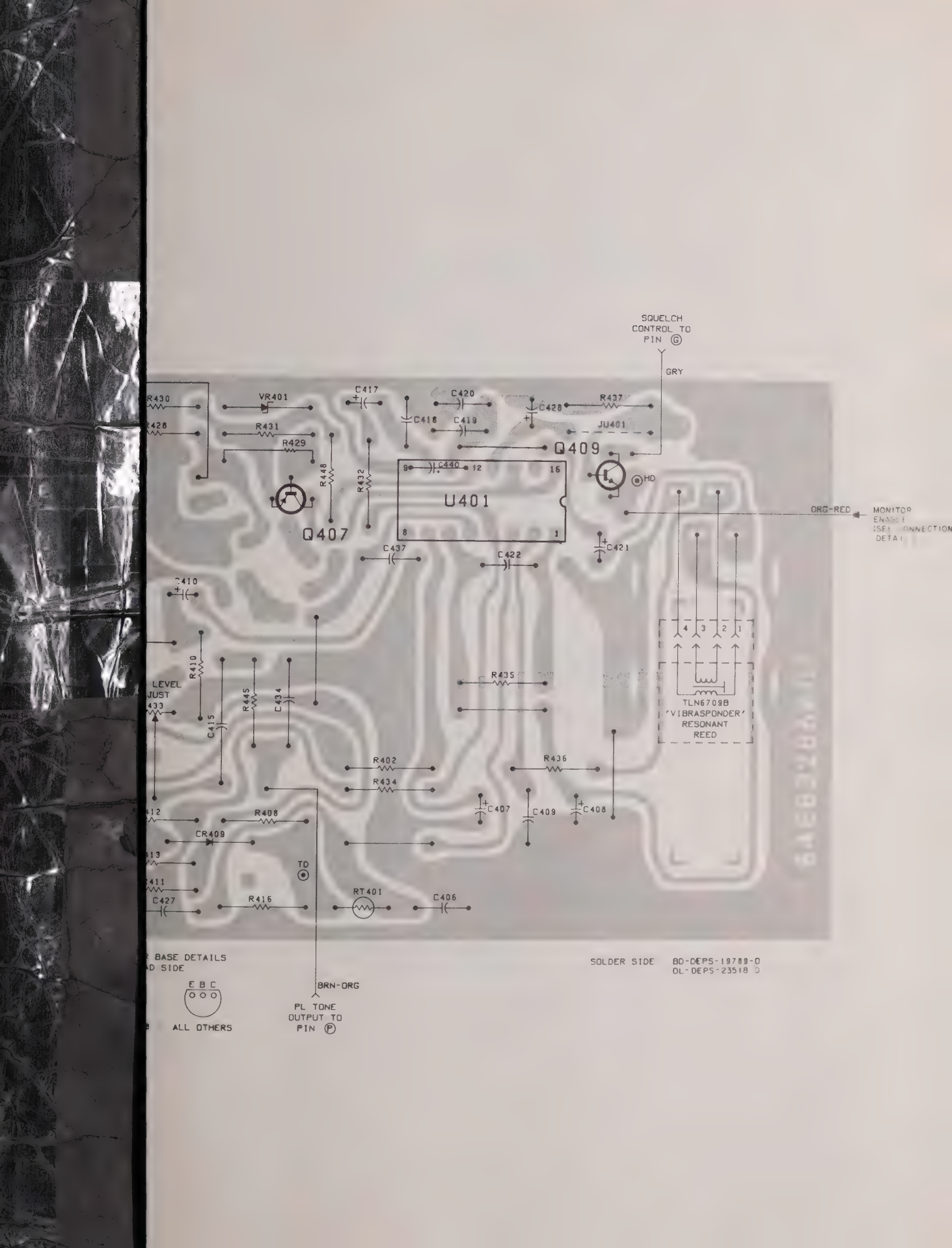
	DESCRIPTION
	rivate-Line"
	PL-5334-O
	CAPACITOR, fixed: uF ±10%; 100 V; unless otherwise stated
01	0.1 +80-20%; 25 V
59	.01 +80-20%; 200 V
23	.0012
59	.01 +80-20%; 200 V
10	220 pF ±20%; 500 V
01	10 +100-0%; 25 V
09	.0047
01	10 +100-0%; 25 V
10	220 pF ±20%; 500 V
	NOT USED
0	0.22
	NOT USED
04	1 +150-0%; 50 V
09	.0047
10	220 pF ±20%; 500 V
01	10 +100-0%; 25 V
10	220 pF ±20%; 500 V
4	.047 ±20%; 100 V
1	0.15; 50 V
4	.047 ±20%; 100 V
01	0.1 +80-20%; 25 V
01	10 +100-0%; 25 V
	NOT USED
59	.01 +80-20%; 200 V
04	1 +150-0%; 50 V
	NOT USED
1	.0068
4	.047 ±20%; 100 V
01	10 +100-0%; 25 V
10	220 pF ±20%; 500 V
	NOT USED
28	.002
04	1 +150-0%; 50 V
	DIODE: (SEE NOTE)
	NOT USED
01	silicon
	NOT USED
06	germanium
01	silicon
	NOT USED
01	silicon
	COIL:
02	6 H
	TRANSISTOR: (SEE NOTE)
	NPN; type M54
	NPN; type M9642
	PNP; type M9643
	NPN; type M54
	NPN; type M9642
	RESISTOR, fixed: ±10%; 1/4 W; unless otherwise stated
	150k
	120k ±5%
	150k
	120k ±5%
	1k
	6.8k
	3.9k
	120k ±5%
	33k
	1.8k
	330
	NOT USED
	4.7k
	NOT USED
	22k
	NOT USED
	1k
	27k
	220
	3.3k
	2.2k

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R433	18-84944C02	variable; 25k
R434	6-124C53	1.5k
R435	6-124C87	22k
R436	6-124C45	680
R437	6-124C97	100k
R438	6-124C73	10k
R439		NOT USED
R440	6-124D02	150k
R441	6-124C89	47k
R442	6-124C97	100k
R443, 444	6-124C73	10k
R445	6-124C77	15k
R446	6-124C85	33k
R447	6-124C49	1k
R448	6-124C97	100k
R449		NOT USED
		THERMISTOR:
RT401	6-82990E18	190 ohms
		INTEGRATED CIRCUIT: (SEE NOTE)
U401	51-84267A04	type 67A04
		DIODE: (SEE NOTE)
VR401	48-82256C25	Zener type; 12 V
	NON-REFERENCED ITEMS	
	TLN6709B	"VIBRASPONDER", resonant reed
	42-84116B02	SOCKET, "Vibrasponder"
	39-10184A10	CONTACT, push-pin; male
	39-10184A24	CONTACT, push-pin; female
	29-84706E06	PIN, female; molex

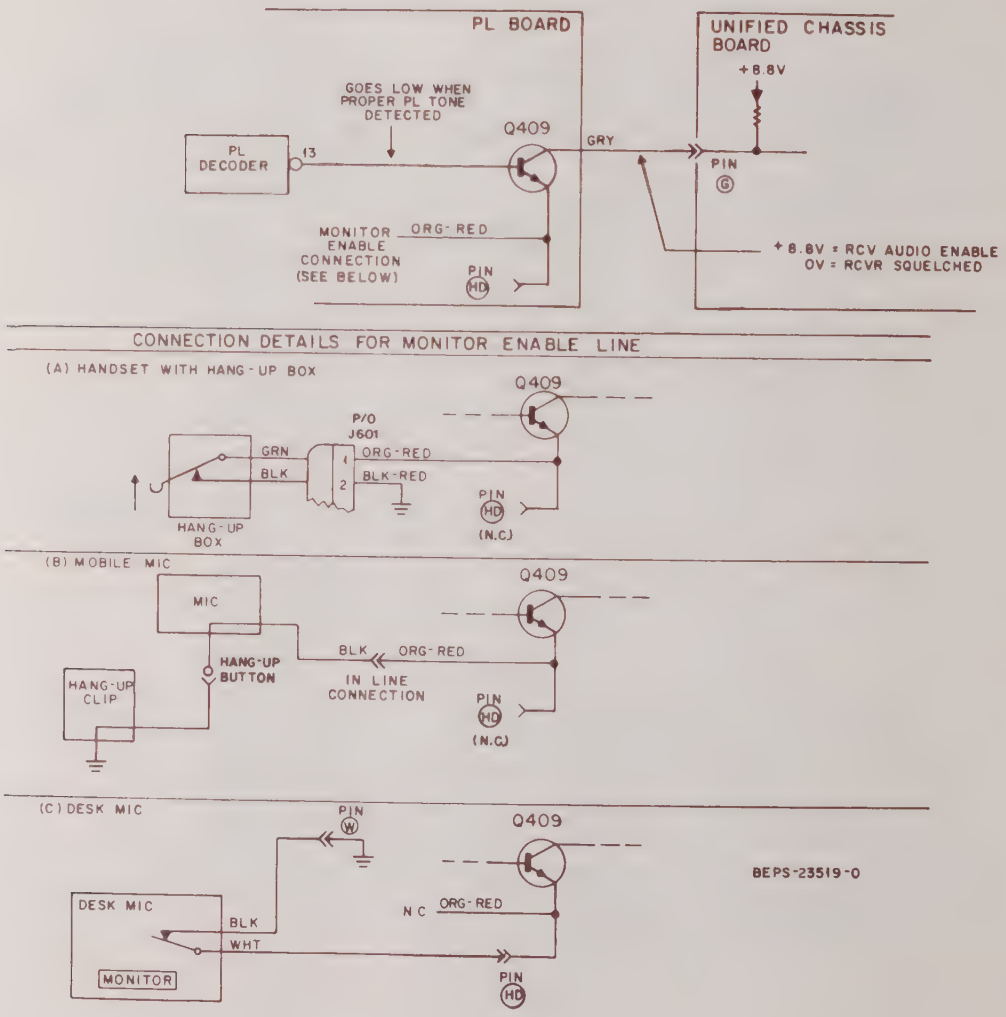
NOTE: For optimum performance, replacement diodes, transistors, and integrated circuits must be ordered by Motorola part number.


AUDIO HIGH-PASS FILTER OUTPUT TO PIN (F)
PTT FROM PIN (H)
YEL-BLU
GRN-BRN
L401
C436
R444
R443
C424
R442
C435
R441
C425
C431
Q408
R421
CR408
C439
R441
C404
R440
C403
C405
Q401
C423
SW A+ FROM PIN (C)
RED-WHT
R405
R409
AUDIO HIGH-PASS FILTER INPUT FROM PIN (E)
YEL-WHT
R407
Q402
C426
R438
R406
C402
R404
C430
R403
GND FROM PIN (T)
BLK
PL TONE FROM DETECTOR PIN (D)
WHT-RED
C401
R401
R445
Q403
R414
C411
SHOWN FROM SOLDER SIDE
C
E
B
Q401,402,40

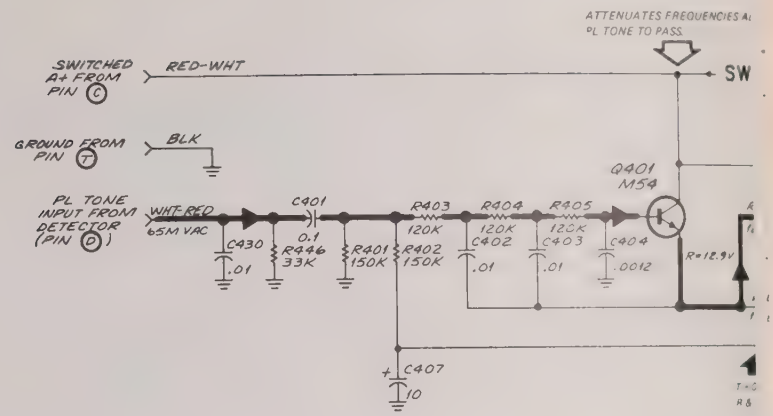


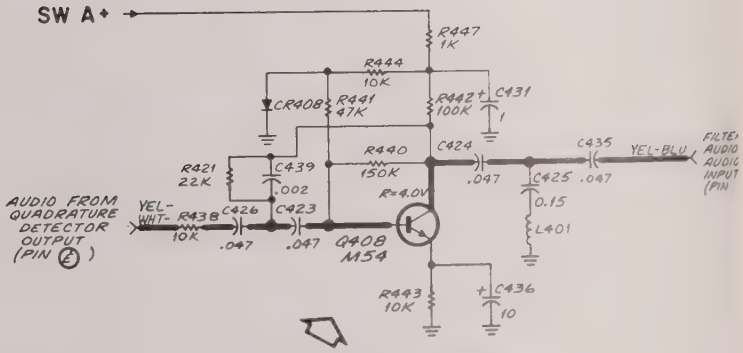

SQUELCH
CONTROL TO
PIN G
GRY
R430
R428
VR401
R431
R429
C417
C420
C418
C419
C428
R437
JU401
Q409
HD
R448
R432
C440
U401
Q407
ORG-RED
MONITOR
C437
C422
C421
C410
R410
LEVEL
JUST
R445
C434
C415
R435
TLN6709B
'VIBRASPONDER'
RESONANT
REED
R402
R434
R436
C407
C409
C408
R408
CR409
TD
C427
R416
RT401
C406
BASE DETAILS
SIDE
E B C
ALL OTHERS
BRN-ORG
PL TONE
OUTPUT TO
PIN P
SOLDER SIDE
BD-DEPS-19789-0
OL-DEPS-23518 0

MONITOR ENABLE CONNECTION DETAIL



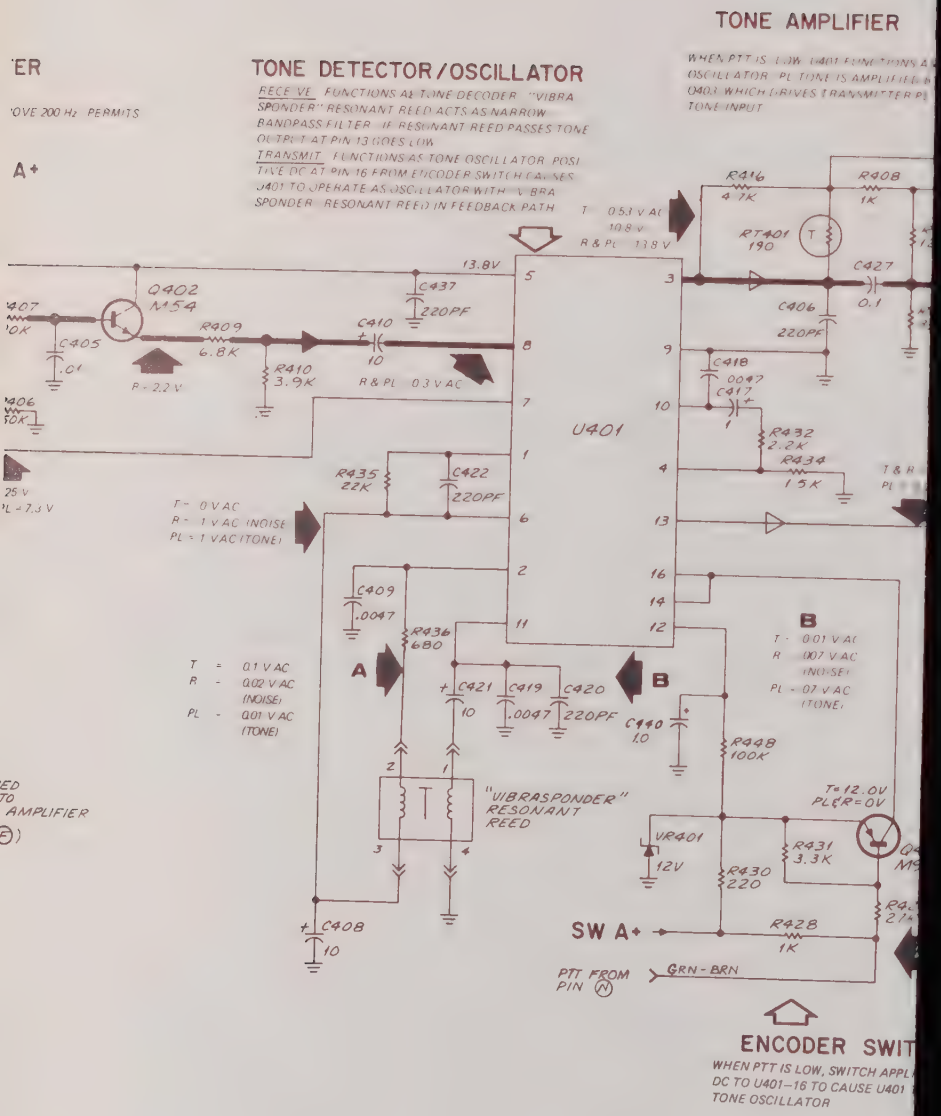
LOW PASS ACTIVE FILT





HIGH-PASS FILTER

PASSES AUDIO FREQUENCIES ABOVE 300 Hz. PREVENTS PL TONE FROM BEING HEARD IN RCVR AUDIO


TONE AMPLIFIER
TONE DETECTOR/OSCILLATOR
RECEIVE FUNCTIONS AS TONE DECODER "VIBRA SPONDER" RESONANT REED ACTS AS NARROW BANDPASS FILTER IF RESONANT REED PASSES TONE OUTPUT AT PIN 13 GOES LOW
TRANSMIT FUNCTIONS AS TONE OSCILLATOR POSITIVE DC AT PIN 16 FROM ENCODER SWITCH CAUSES U401 TO OPERATE AS OSCILLATOR WITH VIBRA SPONDER RESONANT REED IN FEEDBACK PATH
WHEN PTT IS LOW U401 FUNCTIONS AS OSCILLATOR PL TONE IS AMPLIFIED BY Q403 WHICH DRIVES TRANSMITTER PL TONE INPUT
A+
13.8V
Q402
M54
C405
.01
R409
6.8K
R410
3.9K
C410
10
C437
220PF
R - 2.2 V
R & PL 0.3 V AC
U401
R416
4.7K
R408
1K
RT401
190
C427
0.1
C406
220PF
C418
.0047
C417
1
R432
2.2K
R434
1.5K
R435
22K
C422
220PF
T - 0 V AC
R - 1 V AC (NOISE)
PL - 1 V AC (TONE)
C409
.0047
R436
680
A
B
C421
10
C419
.0047
C420
220PF
C440
1.0
R448
100K
T = 0.1 V AC
R - 0.02 V AC (NOISE)
PL - 0.01 V AC (TONE)
"VIBRASPONDER" RESONANT REED
T = 12.0V
PL&R = 0V
VR401
12V
R431
3.3K
R430
220
C408
10
SW A+
R428
1K
PTT FROM PIN N
GRN - BRN
ENCODER SWIT
WHEN PTT IS LOW, SWITCH APPL
DC TO U401-16 TO CAUSE U401
TONE OSCILLATOR

TONE

A+
13.8V
20

CR403
Q403
M9642

R413
1.8K

C411
220PF

R414
330

0.7V

C428
10

T = 2.0 V AC
5.3 V
R & PL = 6.1 V

TONE
LEVEL
ADJ.
(NOTE 3)

R433
25K

C415
0.22

R445
15K

BRN ORG

4.34
.006B

T & R = 0.2 V (RCVR SQUELCHED)
PL = 8.8 V (RCVR UNSQUELCHED)

Q409
M9642

MS

GRY

SQUELCH CONTROL
OUTPUT TO 97
COLLECTOR (PIN 4)

R437
100K

ORG-RED

MONITOR ENABLE
(SEE CONNECTION DETAIL)

HD

R = 12.0 V
T = 0.2 V

SQUELCH SWITCH

THE RECEIVER IS UNSQUELCHED (Q409 OFF) WHEN
EITHER U401 DETECTS THE PROPER PL TONE OR
THE MONITOR ENABLE LINE IS NOT LOW

EEPS-23517 O

TONE "PRIVATE-LINE" ENCODER/DECODER

MODEL TRN6904A

FUNCTION

Encodes and decodes sub-audible "Private-Line" tones. Encoder modulates transmitter. Decoder detects received tone and unsquelches receiver when proper tone is received.

VE
T
RULATOR
)

VERSION CHART

MODEL NO.	VERSION
TRN6904A	0

TES:

UNLESS OTHERWISE NOTED, RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES ARE IN MICROFARADS

VOLTAGE NOTATIONS ARE AS FOLLOWS:

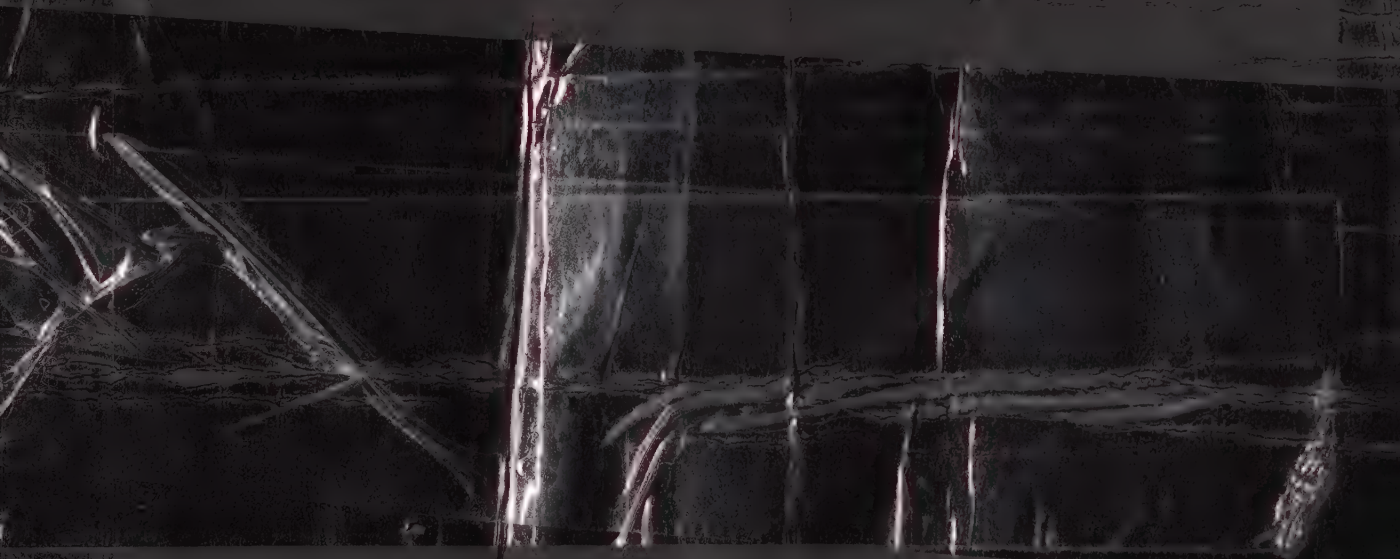
T = TRANSMITTER KEYED
R = RECEIVE, NO TONE PRESENT
PL = RECEIVE, TONE PRESENT

ALL DC VOLTAGES MEASURED WITH 20,000 OHM–PER–VOLTMETER UNLESS OTHERWISE NOTED. ALL AC VOLTAGES ARE RMS VALUES.

DETAILED INSTRUCTIONS ON DEVIATION ADJUSTMENT ARE PROVIDED IN THE TRANSMITTER ALIGNMENT SECTION OF THIS MANUAL.

LEGEND:

- = THEORY OF OPERATION DATA
- = MAINTENANCE DATA
- = RECEIVE SIGNAL
- = TRANSMIT SIGNAL
- = PTT CONTROL SIGNAL
- = SQUELCH CONTROL SIGNAL



"DIGITAL PRIVATE-LINE" ENCODER/DECODER

MODEL TRN6906A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

PARTS LIST

TRN6906A "Digital Private-Line" Encoder/Decoder PL-5335-O

		CAPACITOR, fixed: uF ±5%; 50 V; unless otherwise stated
C301	23-84665F02	15 +100-0%; 35 V
C302	8-82905G39	.023
C303	8-83813H23	.068
C304	8-83813H19	.0039
C305	23-84665F01	10 +100-0%; 35 V
C306	23-84665F02	15 +100-0%; 35 V
C307	8-83813H27	.0033
C308	8-83813H24	.036
C309	8-83813H14	.043
C310	23-82783B48	0.68; 35 V
C311, 312	21-82187B20	.001 ±10%; 100 V
C313	23-84762H07	4.7 ±20%; 10 V
C314	21-82428B59	.01 +80-20%; 200 V
C315	23-82783B27	10 ±10%; 25 V
C316		NOT USED
C317, 318	21-82428B59	.01 +80-20%; 200 V
C319	23-84665F02	15 +100-0%; 35 V
C320	21-82428B59	.01 +80-20%; 200 V
C321	21-83798B01	100 pF; 200 V
C322	21-840849	20 pF; 500 V
C323	21-82428B09	.0047 ±10%; 100 V
C324	23-82783B08	1 ±20%; 35 V
C325	21-82187B20	.001 ±10%; 100 V
C326, 327		NOT USED
C328	21-82187B20	.001 ±10%; 100 V
C329	8-83813H26	.0056
C330	8-82905G32	0.22 ±10%; 50 V
C331	21-82428B59	.01 +80-20%; 200 V
C332	8-83813H26	.0056
C333 thru 342		NOT USED
C343	21-82877B24	220 pF
C344, 345	21-83596E10	220 pF ±10%; 500 V
C346	21-82877B24	220 pF
		DIODE: (SEE NOTE I)
CR301, 302	48-84616A01	hot carrier
CR303	48-83654H01	silicon
CR304, 306		NOT USED
CR305, 307	48-83654H01	silicon
CR308 thru 310		NOT USED
CR311	48-83654H01	silicon
		SOCKET:
J301	9-82071K01	female; 12 contact

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTI
		TRAN
Q301	48-869643	PN
Q302, 303	48-869642	NPN
Q304, 305	48-869643	PN
Q306	48-869642	NPN
Q307, 309	48-869643	PNP; type M9
Q308		NOT
Q310, 311	48-869642	NPN; type M9
Q312 thru 314		NOT
Q315	48-869642	NPN; type M9
Q316	48-869653	field-effect; M
Q317	48-869648	NPN; type M964
		RESI
R301		NOT
R302	6-124A95	82
R303	6-124A90	51
R304	6-124A56	2.0
R305		ffact
R306, 307, 308	6-13755D64	5
R309	6-124A55	1.8
R310, 311	6-124A73	10k
R312	6-124C59	2.7
R313	6-124C73	10k ±10
R314	6-124C83	27k
R315	6-13755D80	82.5
R316	6-124B14	47
R317	6-124A75	12
R318	6-124A89	47k
R319	6-124A99	120
R320, 321	6-124C95	82k
R322	6-124C89	47k
R323	6-124A99	120
R324	6-124C95	82
R325, 326, 327		NOT
R328	6-124C73	10k
R329	6-124A81	22
R330	6-124A83	27k
R331	6-124C97	100
R332	6-124B14	470k
R333	6-124B04	180
R334	6-124A77	15
R335	6-124B14	470
R336	6-124A91	56
R337	6-124A97	100
R338	6-124A99	120
R339		NOT
R340, 341	6-124A97	100
R342	18-84944C01	var: 2
R343	6-124C33	220
R344	6-124C37	330
R345, 346		NOT
R347	6-124B12	390
R348 thru 350		NOT
R351, 352	6-124C81	22k
		INTE
		(SE
U301	51-84267A82	type
U302	51-84320A55	type
U303	51-84320A79	type
		NETW
Z301	51-82142K02	resistiv
		CRYST
Y301	48-82003K01	resonat
		VOLTAG
VR301	48-82256C34	Zener ty
VR302	48-83696E07	Zener type

NOTES:

I. Replacement diodes, transistors, must be ordered by Motorola part num performance.

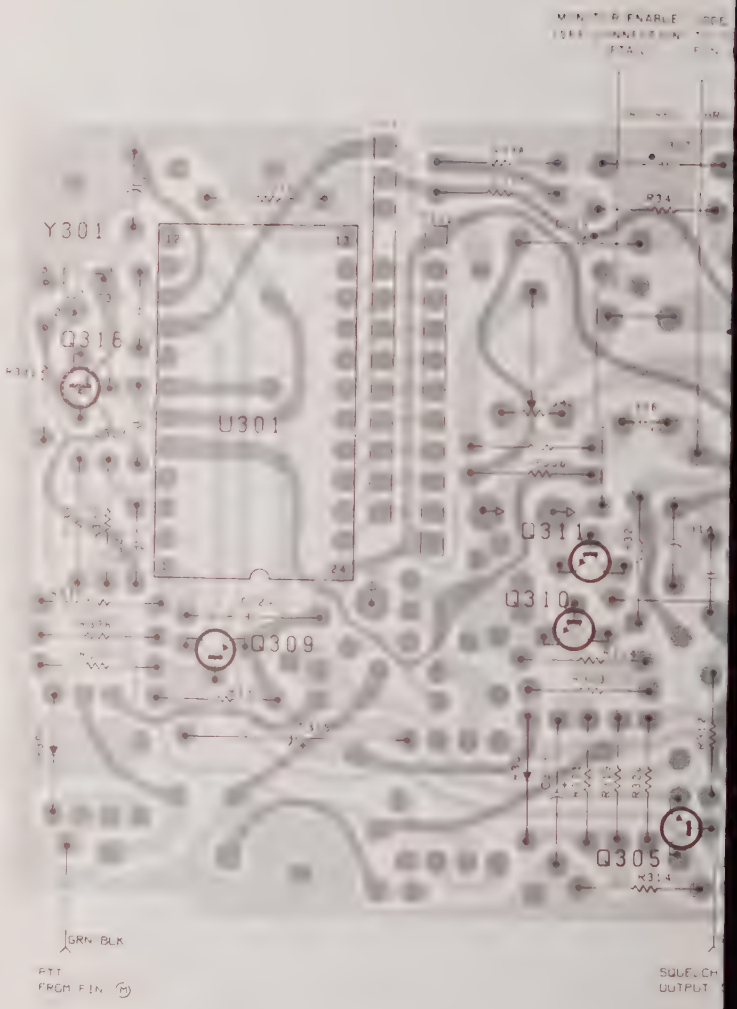
II. When ordering crystal units, specify crystal frequency and crystal type numb

68P81034E53-O
(Sheet 1 of 2)
3/31/77-NPC

ON

E NOTE I)

±5%; 1/4 W;
ated



NOTES
1. SOME MYLAR CAPACITORS ARE SHOWN WITH ONE PLATE MARKED WITH A DOT. THE DOT ON THE SYMBOL CORRESPONDS TO A DOT ON THE CAPACITOR BODY WHICH IDENTIFIES THE OUTER FOIL LEAD

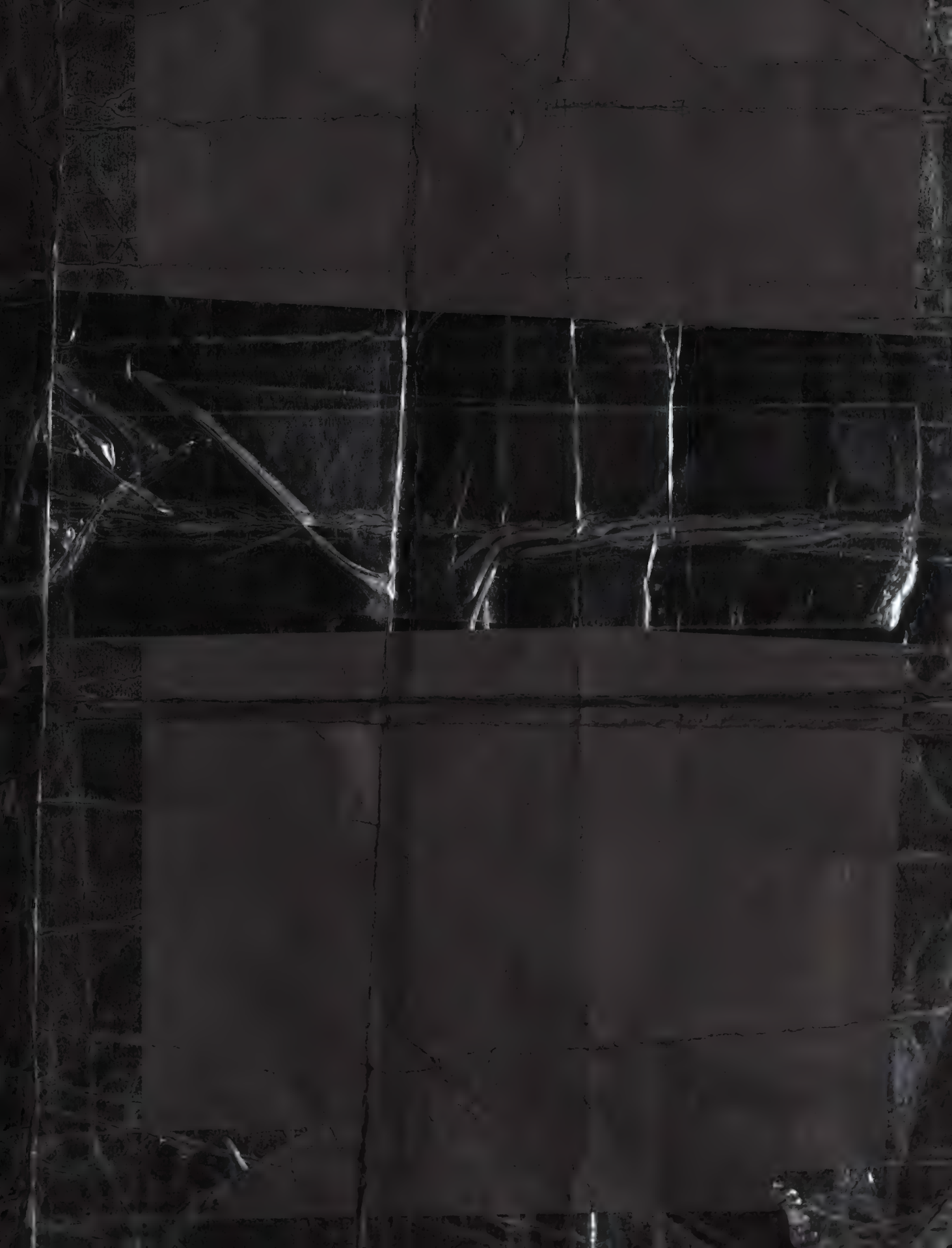
UIT:

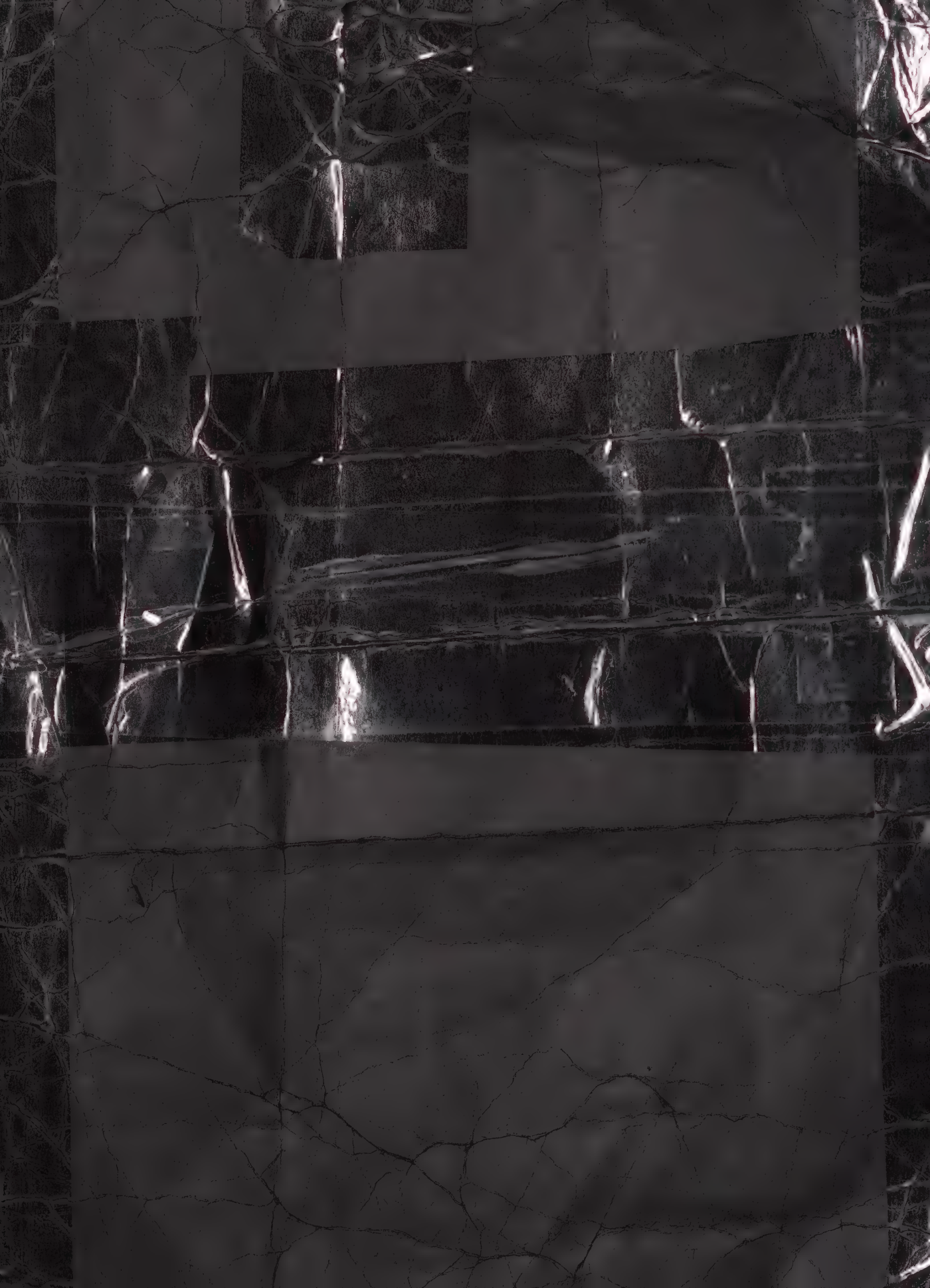
TE II)
kHz

TOR:

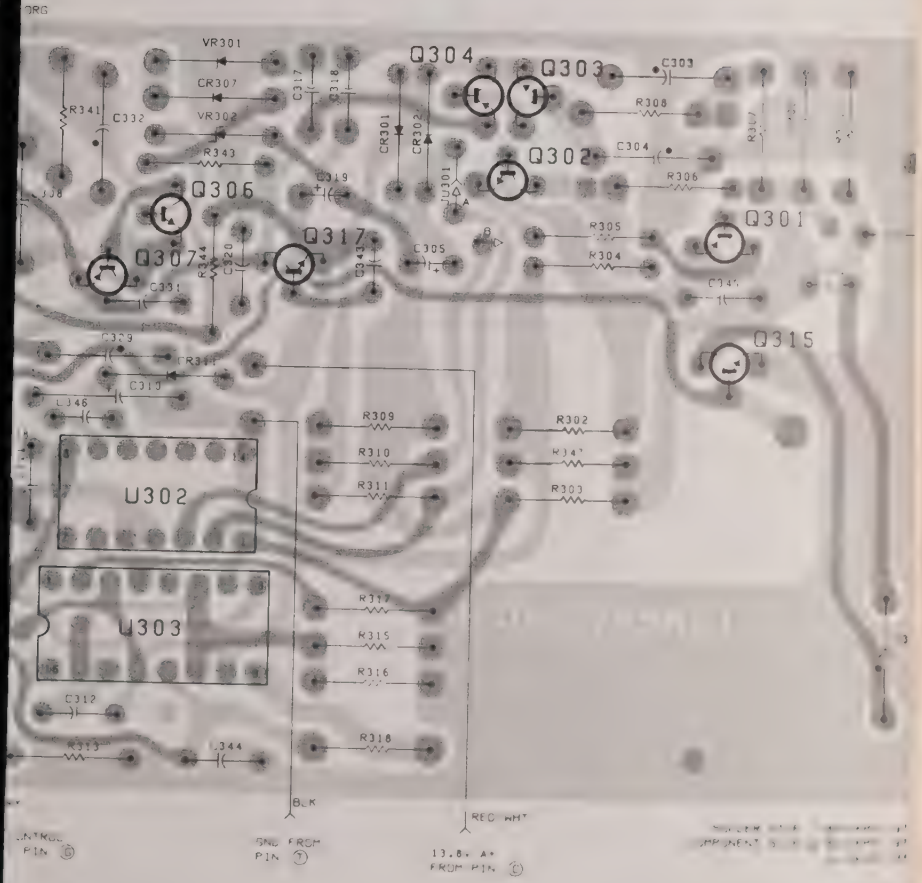
circuits
imum

quency,





SHOWN FROM SOLDER SIDE

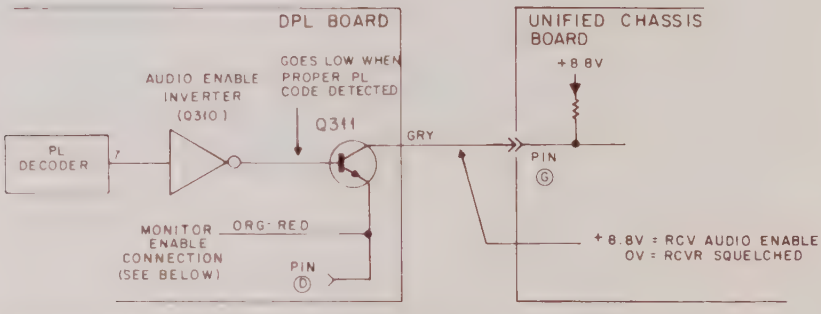


MONITOR ENABLE CONNECTION DETAIL

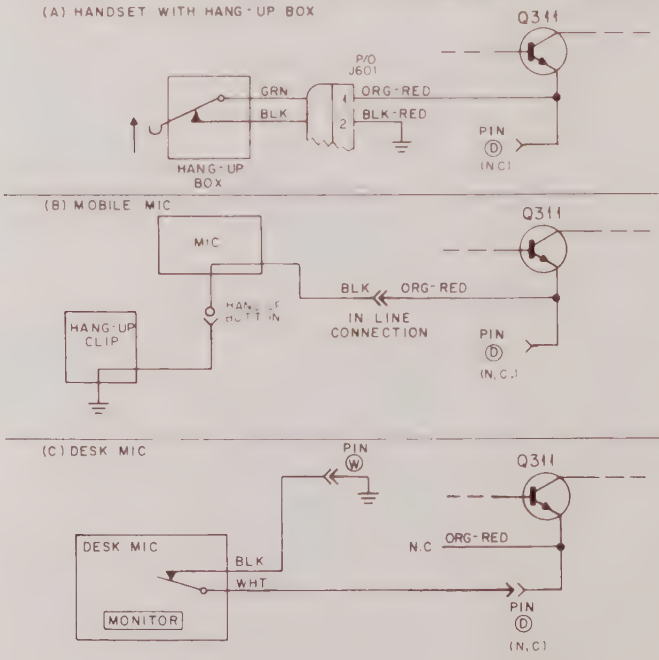
J301 DETAIL
(TOP VIEW)

DOT INDICATES
PIN 1 LOCATION

WHT-RED — CODE INPUT FROM DETECTOR PIN (D)



CONNECTION DETAILS FOR MONITOR ENABLE LINE



TRANSISTOR BASE DETAILS
(LEAD SIDE)

ALL OTHER TRANSISTORS

Y301

BEPS-23570-O

NOTES

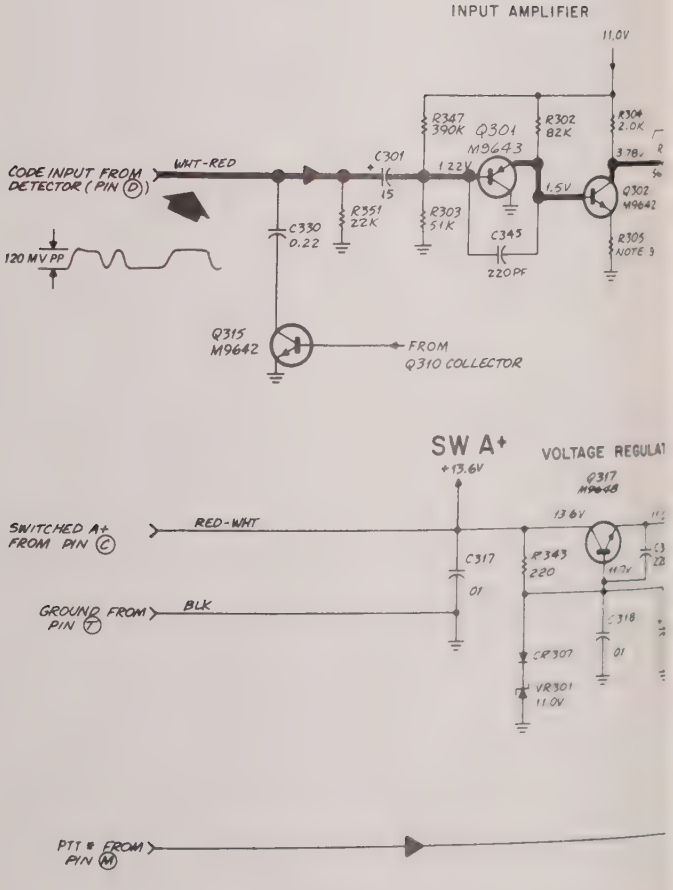
1. UNLESS OTHERWISE
RESISTOR VALUES
CAPACITOR VALUE

2. TRANSISTORS IN CL
CIRCUIT ARE PART

3. WAVEFORMS ARE
CHANNEL RF SIGNA
CONNECTOR. MODU
AND A DIGITALLY CO
DEVIATION.

4. DC VOLTAGES MEA
IMPEDANCE MULTIM
IMPEDANCE), VOLTA
ARE FOR RECEIVE

5. U301 IS A CMOS DE
PRECAUTIONS ON T



INDICATED:
RE IN OHMS
ARE IN MICROFARADS

RRENT SOURCE
OF U303 SEE DETAIL A

TAKEN WITH AN ION
L OF 1000 uV. AT ANTENNA

LATED WITH 1000 Hz
DED SQUELCH IS GAIN AT +5 kHz

URED WITH A HIGH
ETER (11 MEGOHM INPUT
GES IN PARENTHESES
MODE

ICE REFER TO THE HANDLING
HE BACK OF THIS PAGE

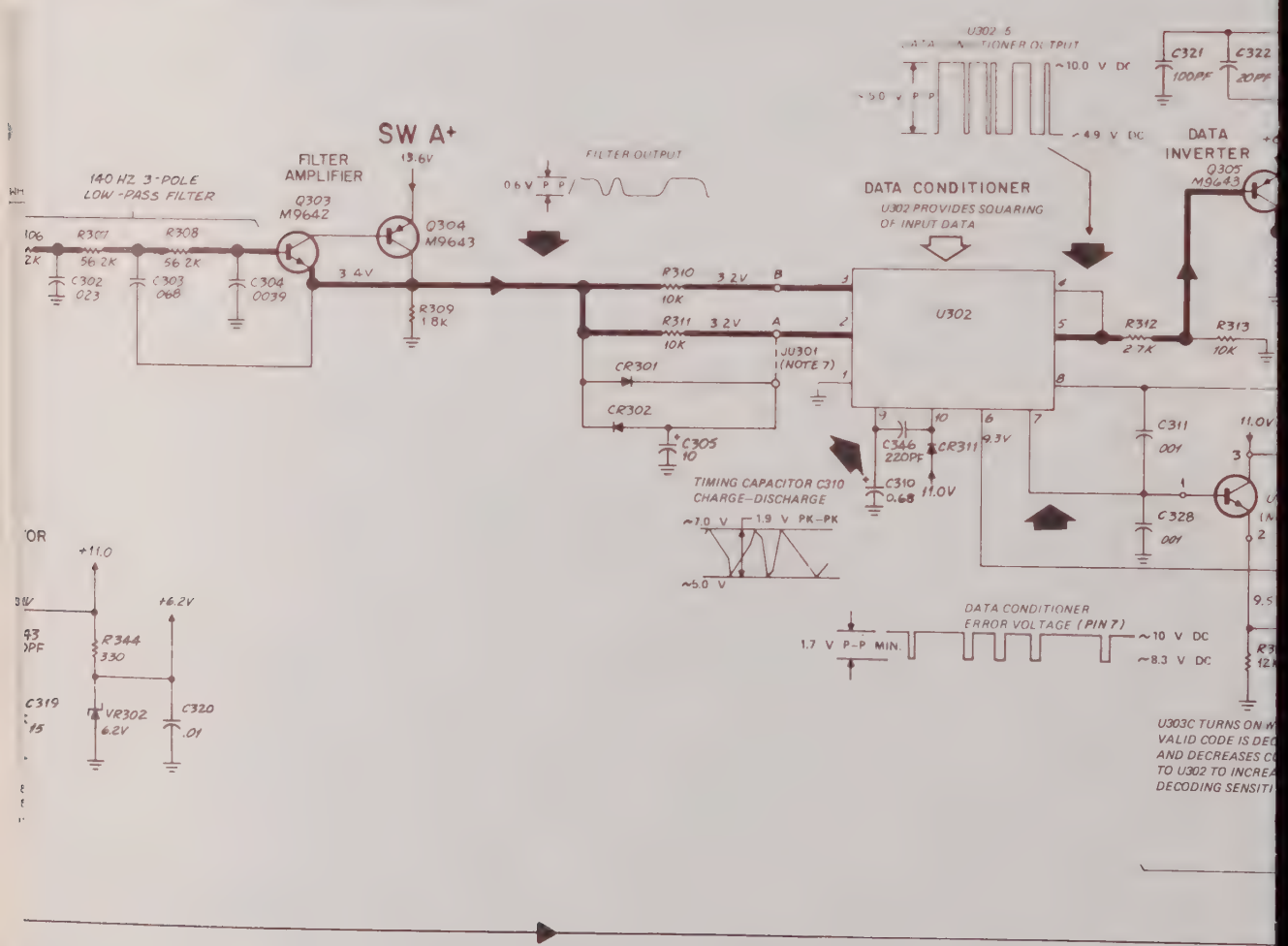
6 TO OBTAIN ACCURATE MEASUREMENT OF TRANSMITTER DEVIATION IN RADIOS EQUIPPED WITH "DIGITAL PRIVATE-LINE" BINARY CODED SQUELCH THE FREQUENCY RESPONSE OF THE DEVIATION MEASURING EQUIPMENT MUST BE 0.1 Hz DETAILED INSTRUCTIONS ON DEVIATION ADJUSTMENT ARE PROVIDED IN THE TRANSMITTER ALIGNMENT SECTION OF THIS MANUAL

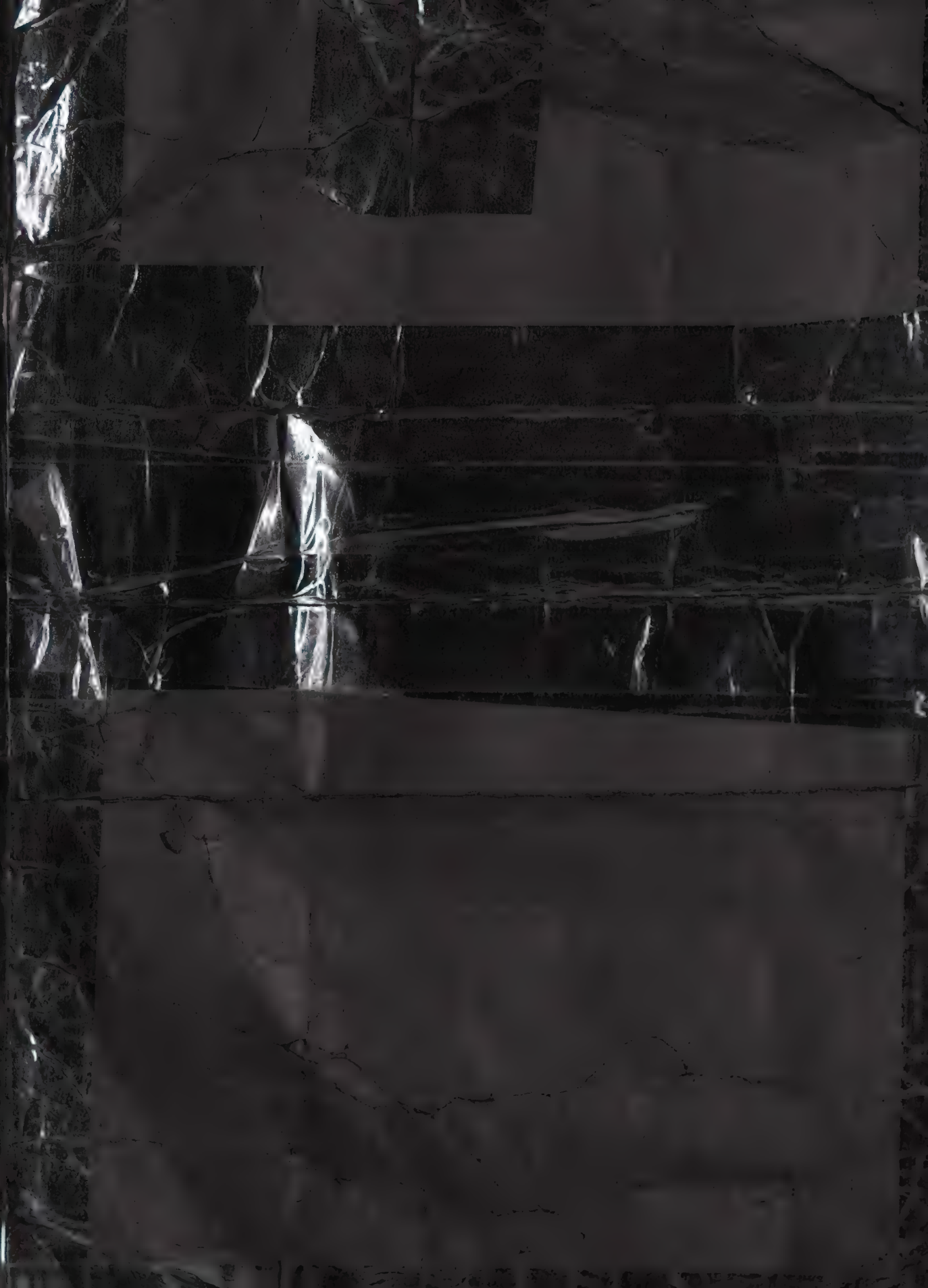
7 IF JU301 IS NORMALLY CONNECTED TO POINT A, CONNECT JU301 TO POINT B TO DECODE INVERTED CODES

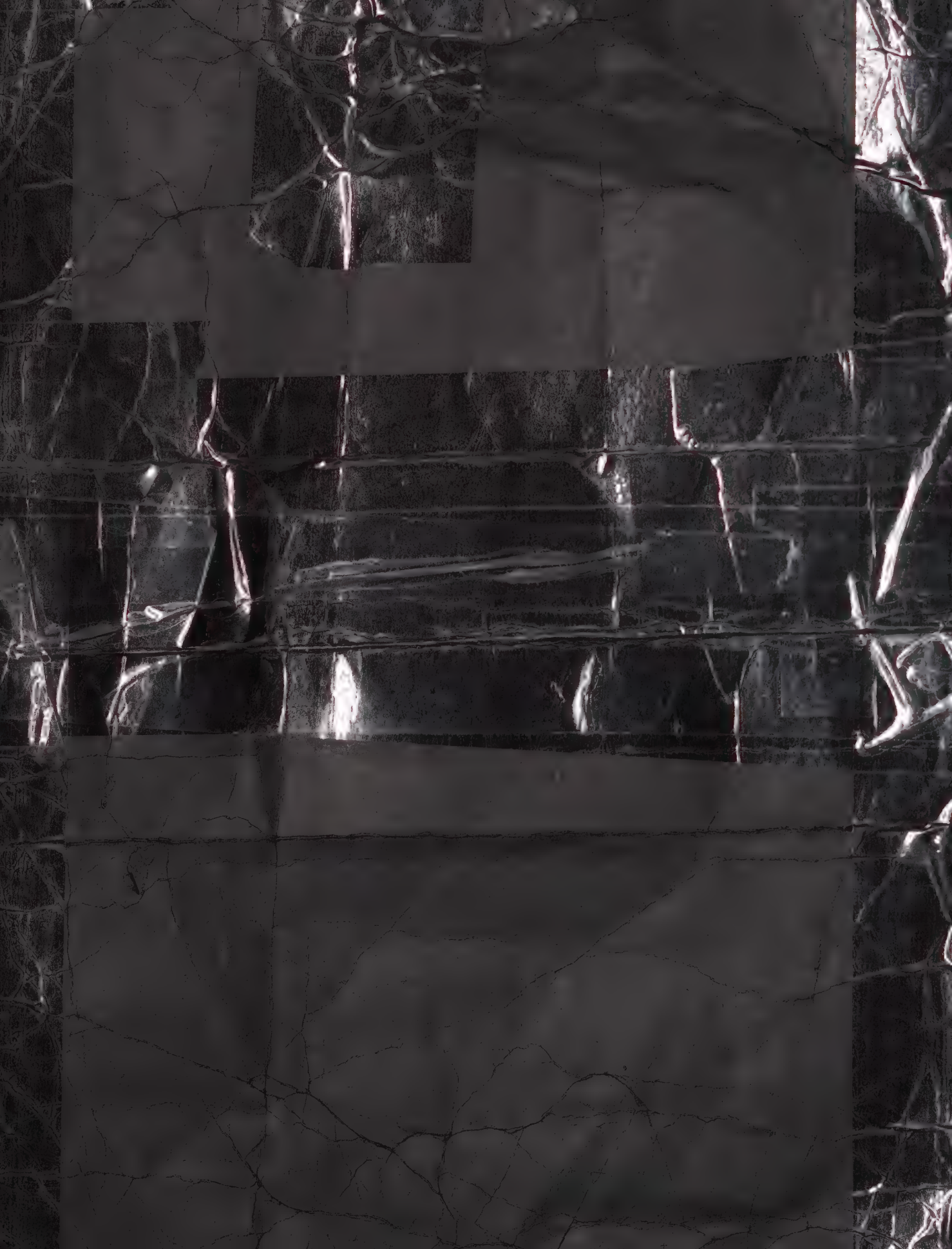
8 THE CODE DISABLE POINTS INDICATED ON THE SCHEMATIC DIAGRAM (U301 OUTPUT LINE) ARE CIRCUIT BOARD PLATING PADS. THESE PADS ARE SHORTED TOGETHER TO DISABLE THE DIGITAL PL CODE WHEN SETTING TRANSMITTER FREQUENCY AND AT TIMES WHEN SETTING MODULATION DEVIATION.

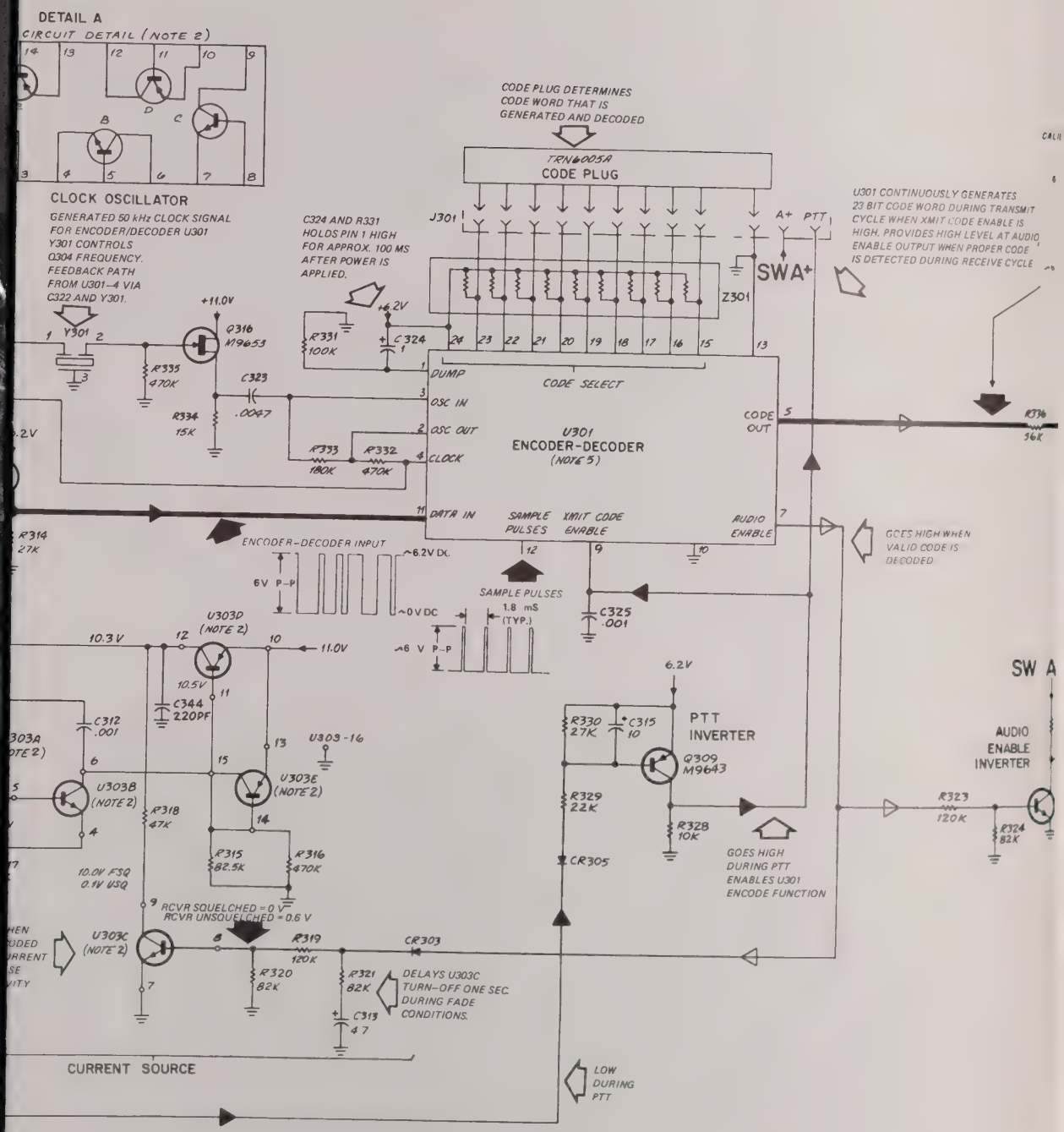
9 RESISTOR R305 FACTORY SELECTED

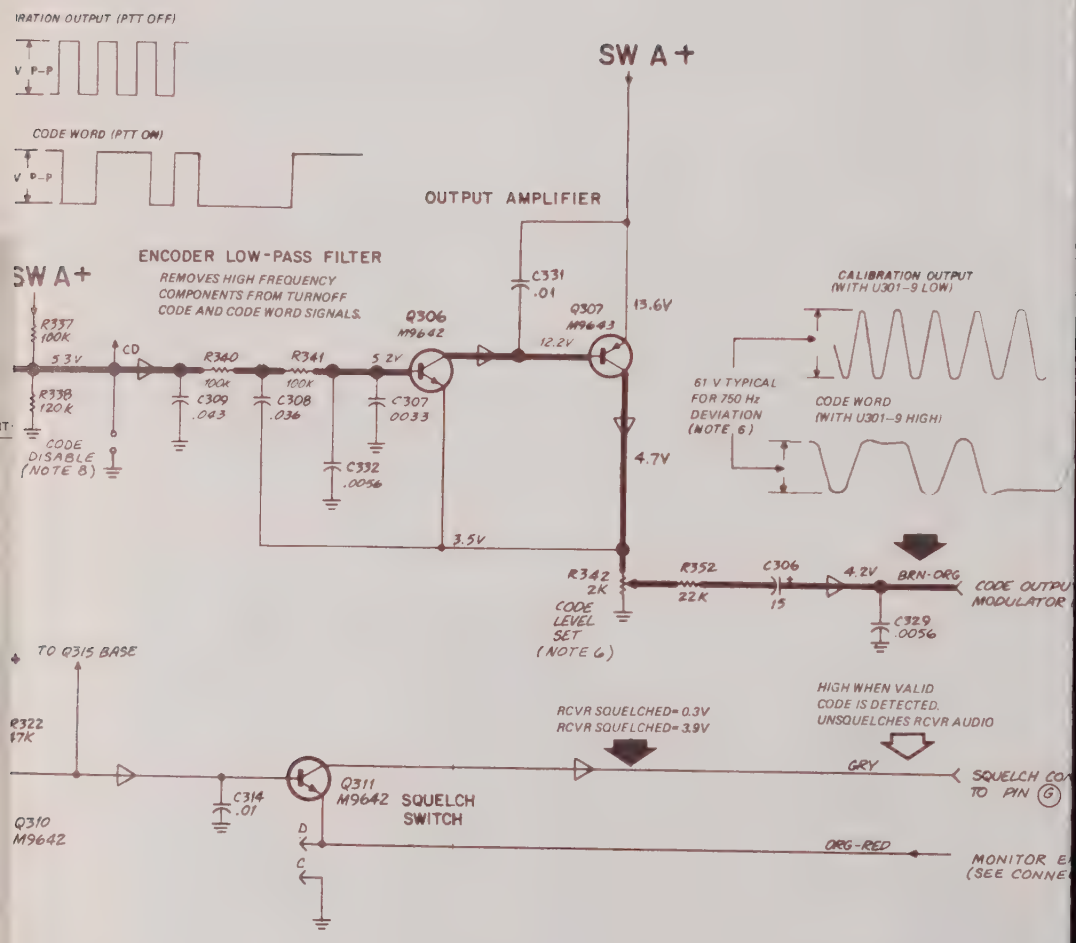
LEGEND
- THEORY OF OPERATION DATA
- MAINTENANCE DATA
- RECEIVED CODE SIGNAL
- TRANSMIT CODE SIGNAL
- PTT CONTROL
- AUDIO ENABLE CONTROL



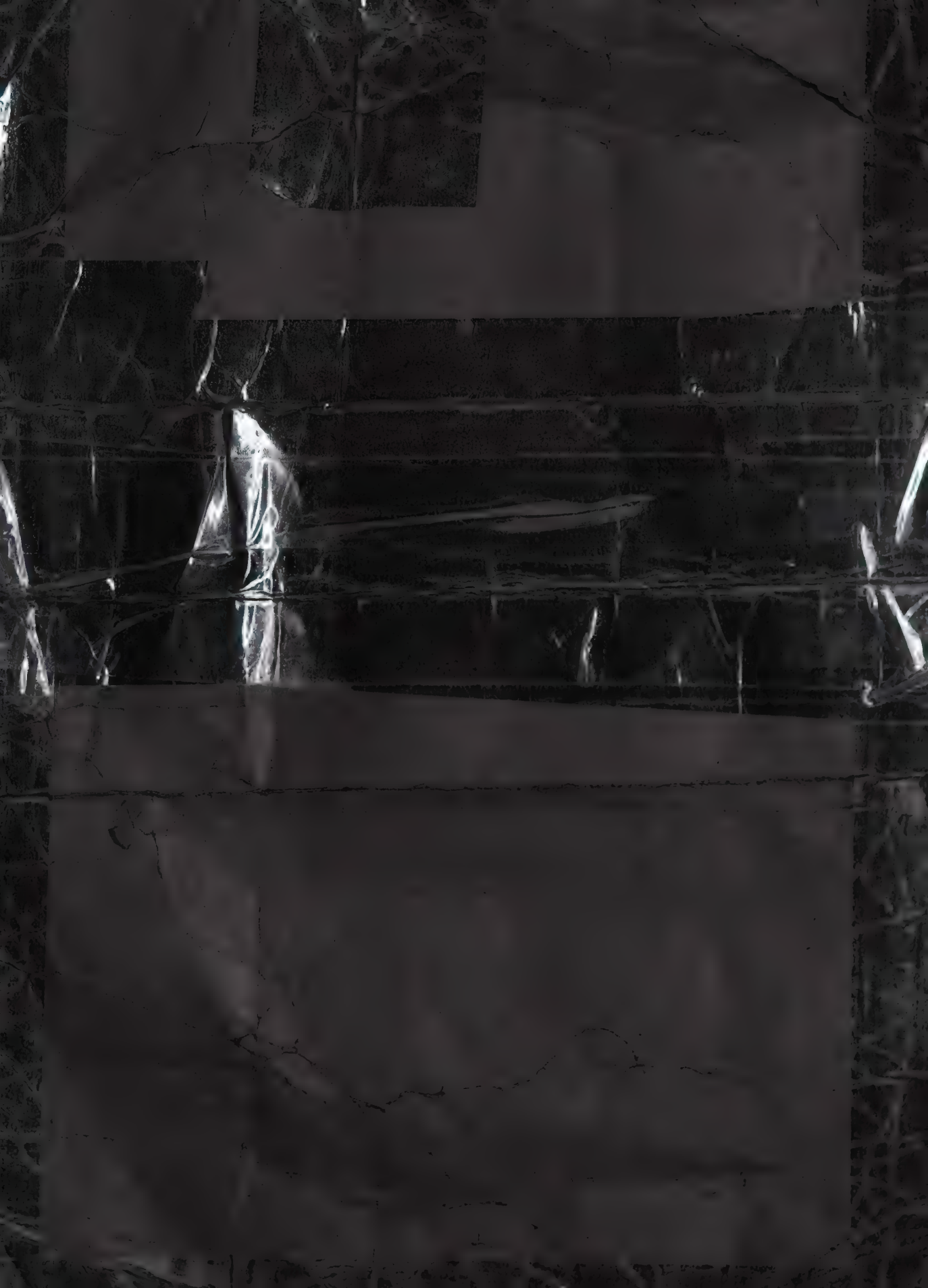


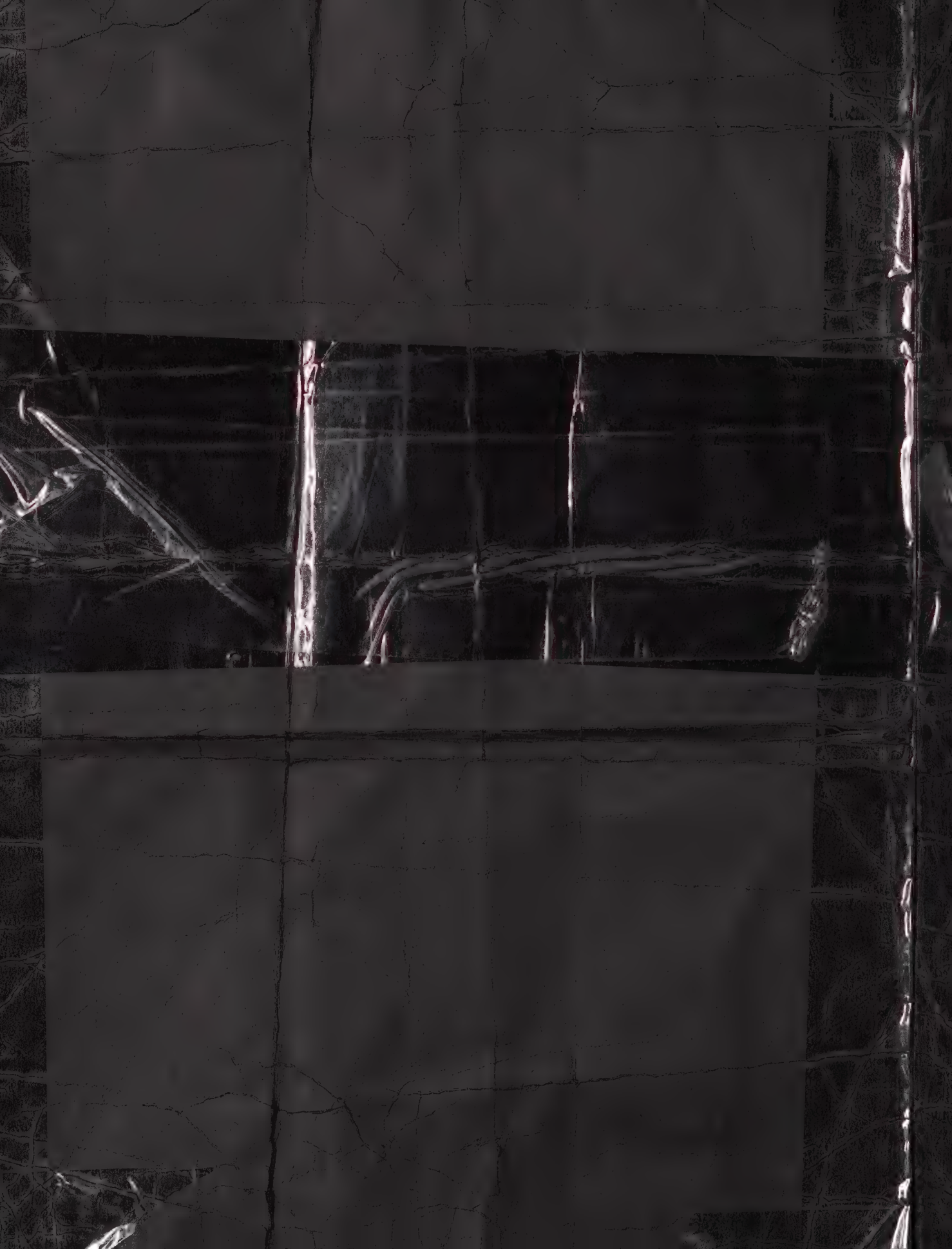



DETAIL A
CIRCUIT DETAIL (NOTE 2)
CLOCK OSCILLATOR
GENERATED 50 kHz CLOCK SIGNAL FOR ENCODER/DECODER U301
Y301 CONTROLS Q304 FREQUENCY.
FEEDBACK PATH FROM U301–4 VIA C322 AND Y301.
CODE PLUG DETERMINES CODE WORD THAT IS GENERATED AND DECODED
TRN6005A
CODE PLUG
U301 CONTINUOUSLY GENERATES 23 BIT CODE WORD DURING TRANSMIT CYCLE WHEN XMIT CODE ENABLE IS HIGH. PROVIDES HIGH LEVEL AT AUDIO ENABLE OUTPUT WHEN PROPER CODE IS DETECTED DURING RECEIVE CYCLE
C324 AND R331 HOLDS PIN 1 HIGH FOR APPROX. 100 MS AFTER POWER IS APPLIED.
J301
A+
PTT
SWA+
Z301
+11.0V
Y301
Q316
M9653
R335
470K
C323
.0047
R334
15K
+6.2V
R331
100K
C324
.1
DUMP
CODE SELECT
OSC IN
OSC OUT
CLOCK
U301
ENCODER-DECODER
(NOTE 5)
CODE OUT
R336
56K
R333
180K
R332
470K
DATA IN
SAMPLE PULSES
XMIT CODE ENABLE
AUDIO ENABLE
GOES HIGH WHEN VALID CODE IS DECODED
ENCODER-DECODER INPUT
6V P-P
~6.2V DC
~0V DC
1.8 mS (TYP.)
~6 V P-P
SAMPLE PULSES
C325
.001
R314
27K
10.3V
U303D
(NOTE 2)
11.0V
10.5V
C344
220PF
C312
.001
U303A
(NOTE 2)
U303B
(NOTE 2)
U303E
(NOTE 2)
U303-16
R318
47K
R315
82.5K
R316
470K
10.0V FSQ
0.1V USQ
RCVR SQUELCHED = 0 V
RCVR UNSQUELCHED = 0.6 V
U303C
(NOTE 2)
R319
120K
CR303
R320
82K
R321
82K
C313
4.7
DELAYS U303C TURN-OFF ONE SEC. DURING FADE CONDITIONS.
CURRENT SOURCE
LOW DURING PTT
6.2V
R330
27K
C315
.10
PTT
INVERTER
Q309
M9643
R329
22K
R328
10K
CR305
GOES HIGH DURING PTT ENABLES U301 ENCODE FUNCTION
SW A
AUDIO
ENABLE
INVERTER
R323
120K
R324
82K


IRATION OUTPUT (PTT OFF)
V P-P
CODE WORD (PTT ON)
V P-P
SW A+
OUTPUT AMPLIFIER
ENCODER LOW-PASS FILTER
REMOVES HIGH FREQUENCY COMPONENTS FROM TURNOFF CODE AND CODE WORD SIGNALS.
SW A+
R337 100K
5.3V
CD
R338 120K
CODE DISABLE (NOTE 8)
R340 100K
C309 .043
R341 100K
C308 .036
5.2V
C307 0033
C332 .0056
3.5V
Q306 M9642
C331 .01
Q307 M9643
13.6V
12.2V
4.7V
CALIBRATION OUTPUT (WITH U301-9 LOW)
61 V TYPICAL FOR 750 Hz DEVIATION (NOTE 6)
CODE WORD (WITH U301-9 HIGH)
R342 2K
CODE LEVEL SET (NOTE 6)
R352 22K
C306 15
4.2V
BRN-ORG
C329 .0056
TO Q315 BASE
R322 47K
RCVR SQUELCHED= 0.3V
RCVR SQUELCHED= 3.9V
HIGH WHEN VALID CODE IS DETECTED. UNSQUELCHES RCVR AUDIO
GRY
C314 .01
Q311 M9642 SQUELCH SWITCH
Q310 M9642
D
C
ORG-RED

EEPS-23520-O





"DIGITAL PRIVATE-LINE" ENCODER/DECODER

MODEL TRN6906A

FUNCTION

Encodes and decodes "Digital Private-Line" codes. Encoder modulates transmitter. Decoder detects received tone and unsquelches receiver when proper code is received.

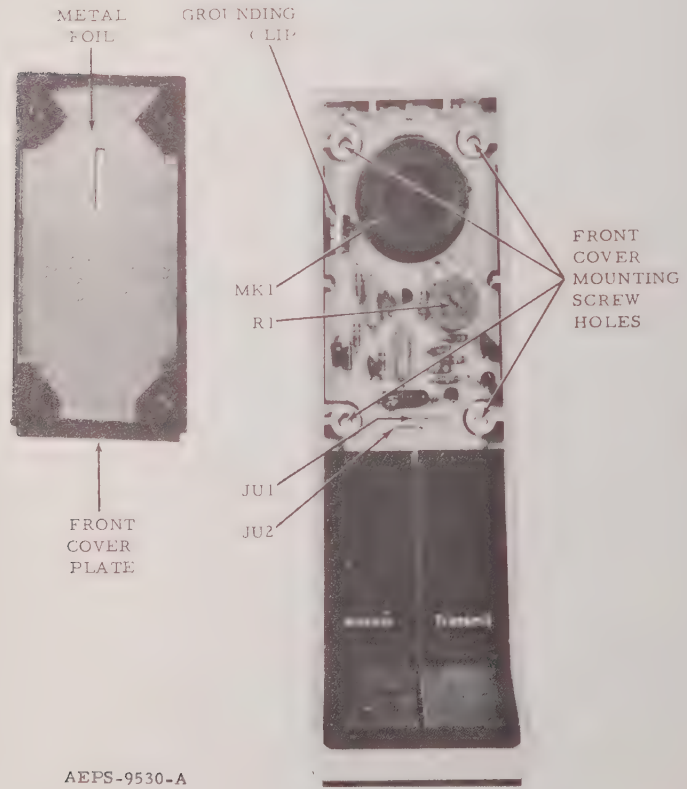
68P81034E53-O
(Sheet 2 of 2)
3/31/77-NPC

DESK MICROPHONES

MODELS TMN1008A-TMN1011A & TMN1018A

FUNCTION

The desk microphones provide a desk surface self-supporting stand to mount the PTT and PL monitor switches and to support the dynamic cartioid microphone element at mouth level. The TMN1008A and TMN1010A are used in "Private-Line" squelch systems and provide both PTT and monitor switches; the TMN1009A and TMN1011A are used with carrier squelch systems and use only the PTT switch. The TMN1018A is used in paging applications and includes both PTT and monitor switches.

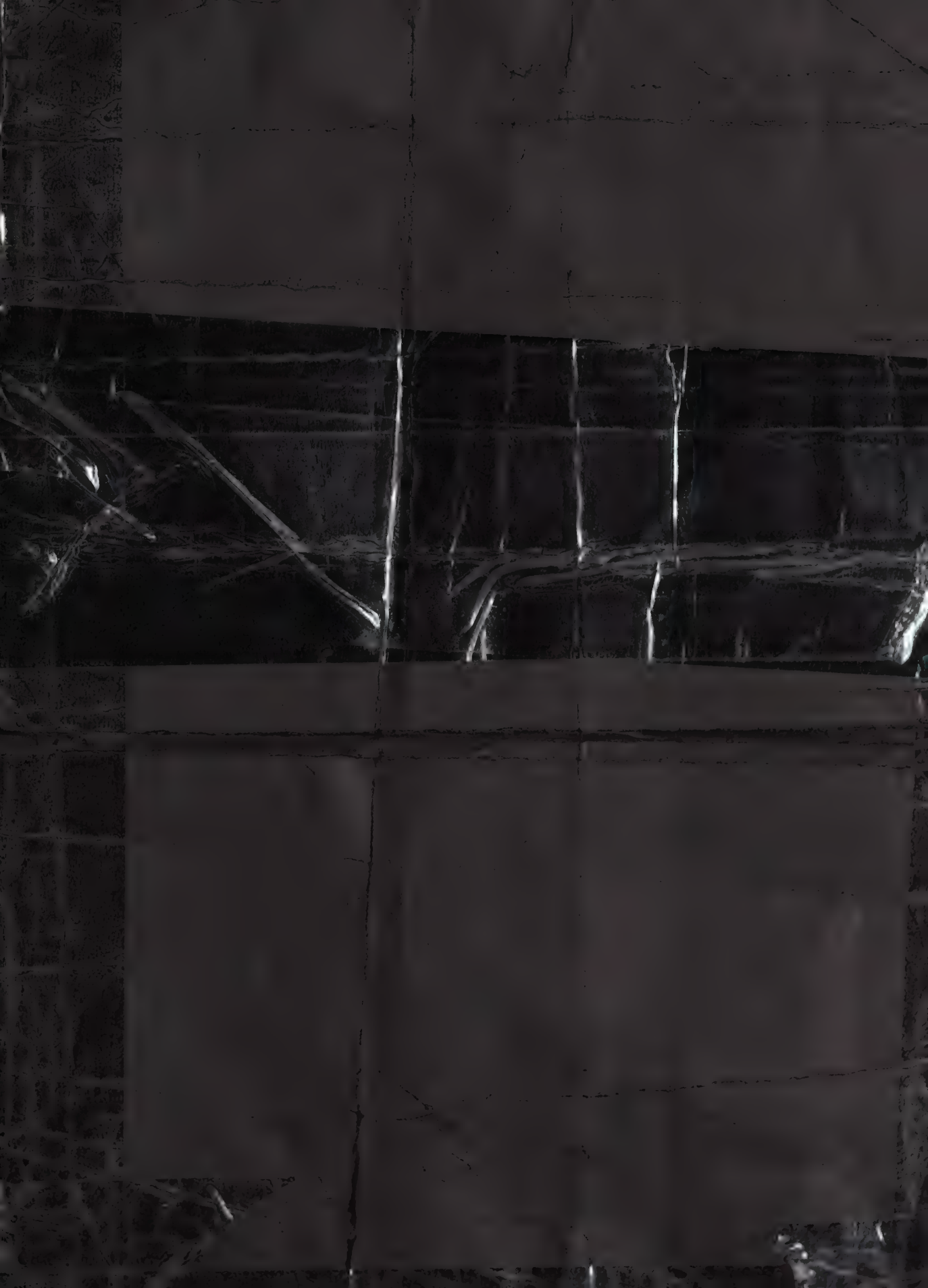


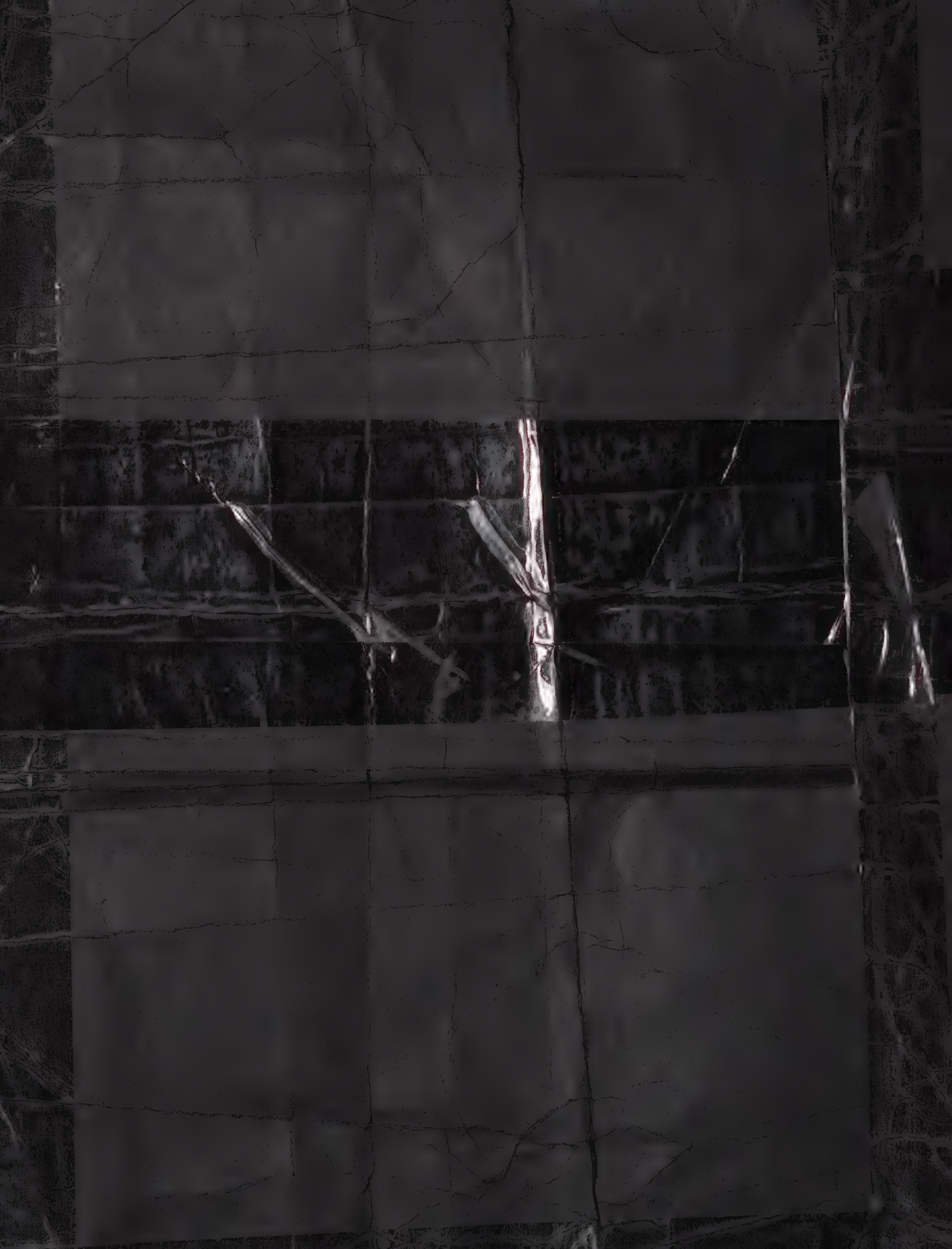
PARTS LIST

TRN6029A & TLN492

REFERENCE SYMBOL	MOTO PART
C1	21-82
C2	8-829
C3	21-82
C4	23-84
C5	21-82
C6	8-829
C7	21-82
MK1	59-84
Q1	48-86
Q2, 3	48-86
R1	18-83
R2	6-129
R3	6-127
R4	6-124
R5	6-129
R7	6-129
R8	6-131
R9	6-129
R11	6-129
	NON
	5-843
	42-847

MICROPHONE DETAIL





ROLA NO.	DESCRIPTION
	5A Microphone Circuit Board PL-3510-O
	CAPACITOR, fixed: uF ±10%
187B08	220 pF; 500 V
87E11	.022; 80 V
187B44	.001; 100 V
762H09	15; ±20%; 20 V
187B44	.001; 100 V
87E02	.047; 200 V
187B45	470 pF; 500 V
	CARTRIDGE, microphone:
40E01	miniature
	TRANSISTOR: (SEE NOTE)
9571	PNP; type M9571
9594	NPN; type M9594
	RESISTOR, fixed: ±10%; 1/4 W; unl. stated
83G34	variable; 1.5 meg ±30%
26	100k
05	15k
814	470k ±5%
68	10k ±5%
07	2.7k ±5%
58	270k ±5%
31	3.3k
53	100
	-REFERENCED ITEMS
1E01	GROMMET, cartridge
24E01	CLIP, grounding

AEPS-9528-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

PARTS LIST

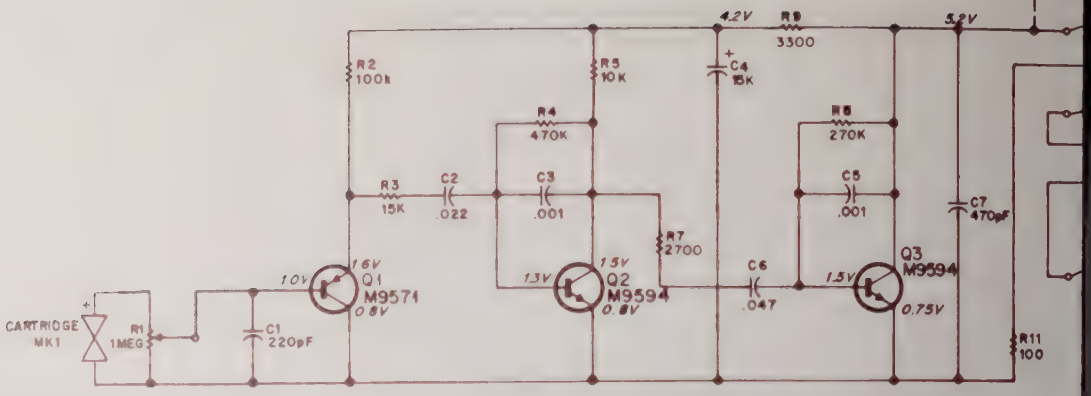
THN6254A (PL), & THN6255A (Carrier Squelch), THN6320A (Paging)
Microphone Housing & Hardware Kit PL-3573-

S1, 2	40-84711E03	SWITCH, leaf: assembly: S1 has 1 form A, 1 form B and 1 form C; S2 ha 1 form A and 1 form B (THN6254A and THN6320A)
S1	40-84711E02	assembly: includes 1 form A and 1 form B (THN6255A)
	NON-REFERENCED ITEMS	
	3-136676	SCREW, switch mtg. 4-40 x 1/4 pnl hex
	1-80779B59	CABLE ASSEMBLY includes connector, 28-83372F02
	15-84186E01	COVER, front
	15-84188E01	COVER, rear
	15-84191E01	HOUSING
	26-84720E01	FOIL, grounding, front cove
	26-84721E01	FOIL, grounding, rear cover
	38-84184E02	BUTTON, left hand (THN6154
	38-84184E01	BUTTON, left hand (THN6155
	38-84192E01	BUTTON, right hand
	42-84725E01	CLIP, retainer
	47-84193E01	SHAFT
	47-84194E01	SHAFT EXTENSION
	47-84723E01	SHAFT COUPLING (THN6154 only)
	22-82591C05	PIN, roll (THN6154A only)
	64-84183E01	PLATE, base
	75-84722E01	PAD, base plate
	3-138809	BASE PLATE SCREW 4-40 x 5/16 phl bn hx bk ox
	3-138810	FRONT COVER SCREW 4-40 5/8 phl bn hx bk ox
	4-10058B10	WASHER ("TEFLON")

THN6252A (PL) & THN6253A (Carrier Squelch
Microphone Housing & Hardware Kit PL-3511

S1, 2	40-84711E03	SWITCH, leaf: assembly: S1 has 1 form A, 1 form B and 1 form C; S2 1 form A and 1 form B (THN6252A
S1	40-84711E02	assembly: includes 1 form 1 form B and 1 form C (THN6253A)
	NON-REFERENCED ITEMS	
	3-136676	SCREW, switch mtg. 4-40 1/4 pnl hex
	1-80780B29	CABLE ASSEMBLY incl 39-[illegible] req
	15-84186E01	COVER, front
	15-84188E01	COVER, rear
	15-84191E01	HOUSING
	26-84720E01	FOIL, grounding, front c
	26-84721E01	FOIL, grounding, rear c
	38-84184E02	BUTTON, [illegible] (THN6
	38-84184E01	BUTTON, [illegible] (THN
	38-84192E01	BUTTON, [illegible]
	42-84725E01	CLIP, shaft retainer
	47-84193E01	SHAFT, [illegible]
	47-84194E01	SHAFT EXTENSION
	47-84723E01	SHAFT COUPLING (THN6154 only)
	22-82591C05	PIN, roll (THN6154A only)
	64-84183E01	PLATE, base
	75-84722E01	PAD, base plate
	3-138809	BASE PLATE SCREW 4-40 x 5/16 phl bn hx bk ox
	3-138810	FRONT COVER SCREW 4-40 5/8 phl bn hx bk ox
	4-10058B10	WASHER ("TEFLON")

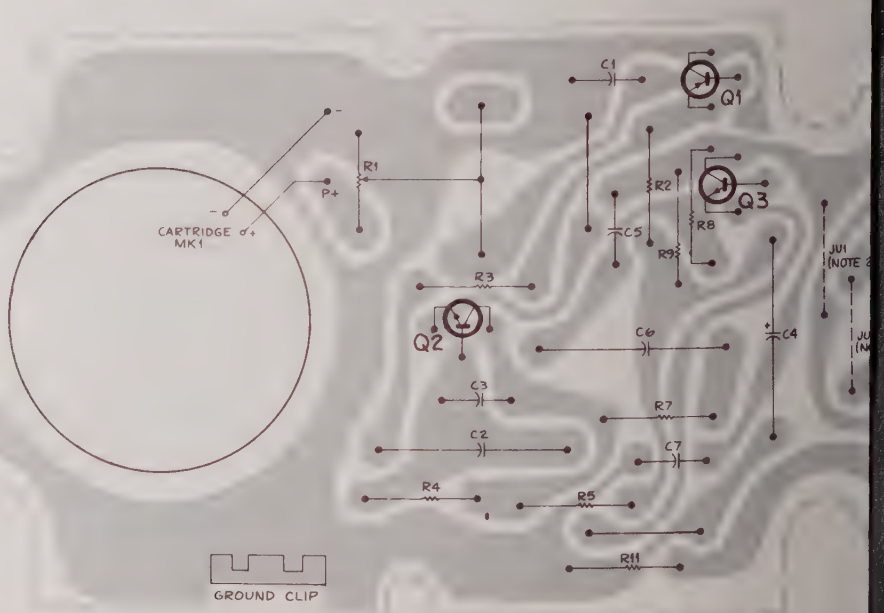
NOTE: Replacement transistors must be ordered by Motorola part number only for optimum performance



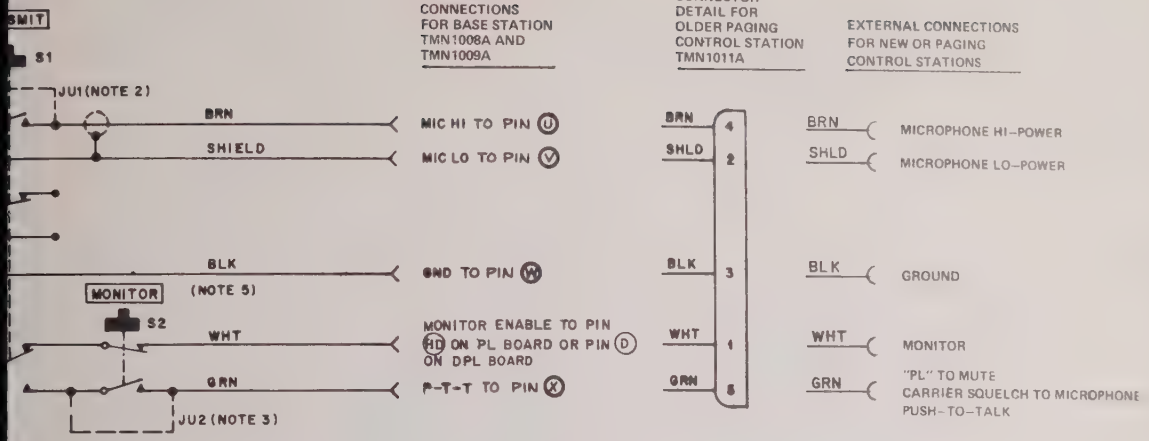
NOTES

1. UNLESS OTHERWISE STATED ALL CAPACITOR VALUES ARE IN MICROFARADS
2. REMOVE JU1 FOR PARALLEL MIC OPERATION
3. JU2 IS NORMALLY REMOVED TO ENSURE THAT THE OPERATION MONITOR THE CHANNEL (FCC REQUIREMENT) IN THIS CASE BOTH THE MONITOR AND TRANSMIT BUTTONS MUST BE PRESSED TO TRANSMIT RELEASING EITHER SWITCH ENDS THE TRANSMISSION
4. ALL DC VOLTAGE READINGS ARE WITH RESPECT TO THE MIC LO LEAD
5. MONITOR SWITCH S2 IS PRESENT IN MODEL TMN1008A & TMN1010A ONLY

TMN1010A	TMN1011A
1	1
1	1



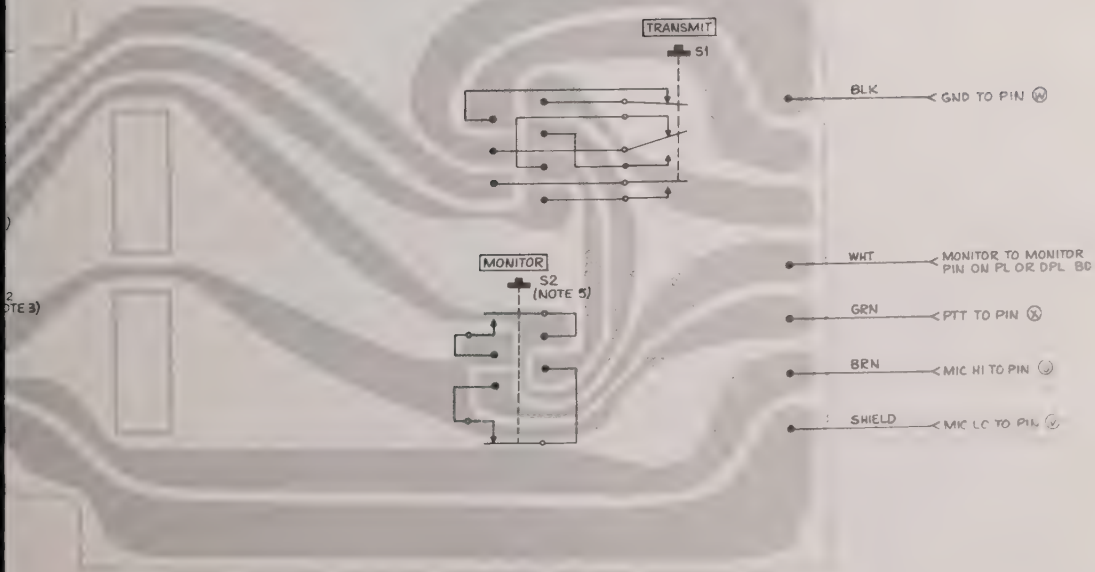
TRANSISTOR DETAIL



DEPS-17648-D

DESK MICROPHONE MODEL COMPLEMENT

TMN1008A	TMN1009A	TMN1018A	DESCRIPTION	VERSION
	1		TLN4925A MICROPHONE CIRCUIT BOARD	2
1		1	TRN6029A MICROPHONE CIRCUIT BOARD	0
1			THN6252A MICROPHONE HOUSING AND HARDWARE KIT	0
	1		THN6253A MICROPHONE HOUSING AND HARDWARE KIT	0
			THN6254A MICROPHONE HOUSING AND HARDWARE KIT	0
			THN6255A MICROPHONE HOUSING AND HARDWARE KIT	0
		1	THN6320A MICROPHONE HOUSING AND HARDWARE KIT	0



VN FROM COMPONENT SIDE

MOXY
Two-Way FM Radio
150.8-174 MHz

68P81034E55-O

MOTOROLA

MOXY

Two-Way FM Radio

450-470 MHz

Instruction Manual

68P81034E60-O

MOXY
TWO-WAY FM RADIO
450-470 MHz

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MOTOROLA INC.
Communications Division

service publications
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5/25/77-NPC

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Exciter Schematic Diagram . . . . . 68P81035E27 (Sheet 4)
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TRN6904A "Private-Line" Encoder/Decoder
Schematic Diagram and Circuit Board Detail 68P81034E52
TRN6906A "Digital Private-Line" Encoder/Decoder
Schematic Diagram and Circuit Board Detail 68P81034E53
TMN1008A & TMN1009A Desk Microphone Schematic Diagram,
Circuit Board Detail and Parts List 68P81030E06
Parts List and CMOS Handling Precautions 68P81034E53

B227 Option 2 PPM Transmit Frequency Stability, Instruction Section 68P81035E29

SAFETY INFORMATION

The United States Department of Labor, through the provisions of the Occupational Safety and Health Act of 1970 (OSHA), has established an electromagnetic radiation safety standard which applies to any two-way mobile radio equipment. Normal use of this radio will result in exposures far below the OSHA limit. There are no reported incidents of physical damage resulting from the use of this type radio. However, the following precautions are recommended:

DO NOT operate the transmitter when someone outside the vehicle is within two feet of the mobile antenna.

DO NOT operate the transmitter near unshielded electrical blasting caps or in an explosive atmosphere.

EPS-18196-B

SPECIFICATIONS

GENERAL

MAXIMUM BATTERY DRAIN @ 13.8 V	TRANSMIT	RECEIVE	STANDBY (SQUELCHED)
	4.5A	1 A	0.3A
FREQUENCY RANGE	450-470 MHz		
DIMENSIONS	2¼" H x 6½" W x 10"D		
WEIGHT	2.2 kg. (4.8 lbs)		

TRANSMITTER	
RF POWER OUTPUT	10 Watts
SPURIOUS & HARMONIC EMISSIONS*	56 dB below carrier
OUTPUT IMPEDANCE	50 ohms
FREQUENCY STABILITY	± 0.0005%; – 30°C to + 60°C (+ 25°C reference) ± 0.0002% (Optional base only)
MODULATION	16F3
AUDIO SENSITIVITY	160 mV ± 3 dB for 3.0 kHz deviation at 1000 Hz
FM HUM & NOISE	– 60 dB below ± 3.0 kHz deviation at 1000 Hz
AUDIO RESPONSE	+ 1, – 3 dB from 6 dB/octave pre-emphasis (300 to 3000 Hz)
AUDIO DISTORTION	Less than 3%

*Per EIA specification RS-152B, paragraph 4.

RECEIVER	
CHANNEL SPACING	25 kHz
SELECTIVITY - EIA SINAD	– 70 dB @ ± 25 kHz
INTERMODULATION EIA SINAD	– 70 dB
EIA MODULATION ACCEPTANCE	± 6 kHz
SENSITIVITY	0.5 uV or less for 20 dB quieting. 0.35 uV or less for 12 dB SINAD.
FREQUENCY STABILITY	± 0.0005%; – 30°C to + 60°C (+ 25°C reference)
SPURIOUS REJECTION	Greater than 70 dB
IMAGE REJECTION	Greater than 60 dB
SQUELCH THRESHOLD SENSITIVITY	Less than 0.2 uV
AUDIO OUTPUT	3 watts, with less than 5% distortion
AUDIO RESPONSE	+ 2, – 8 dB from 6 dB/octave de-emphasis (300 to 3000 Hz)

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

FCC TRANSMITTER LICENSE DESIGNATIONS

Freq Range (MHz)	Freq Stability (%)	Single Frequency	Two Frequency
450-470	.0005	CC4260	CC4261
	.0002	CC4260(C)	CC4261(C)

FCC RECEIVER CERTIFICATION NUMBERS

Single Frequency: RC0169

Two Frequency: RC0170

MOTOROLA

MODEL CHART

FOR

UHF "MOXY" MOBILE/BASE STATION

FM TWO-WAY RADIO

450-470 MHz 10 W RF POWER

+12 V DC 117 V AC

CODE:

X = ONE ITEM SUPPLIED WITH EACH RADIO

◢ = ONE ITEM SUPPLIED WITH EACH RADIO, DEPENDENT UPON FREQUENCY

2 = NUMBER INDICATES QUANTITY SUPPLIED WITH EACH RADIO

ITEM	DESCRIPTION	MODEL NUMBER	D24GMA1000AK	D24GMA1300AK	D24GMA3000AK	D24GMA3300AK	D24GMA6000AK	D24GMA6300AK	L34GMB1100AM	L34GMB1130AM	L34GMB3100AM	L34GMB3130AM	L34GMB6100AM	L34GMB6130AM
	MOBILE RADIO MODELS													
	SQUELCH TYPE		CARRIER	CARRIER	"PRIVATE-LINE"	"PRIVATE-LINE"	"DIGITAL PRIVATE-LINE"	"DIGITAL PRIVATE-LINE"	BASE STATION RADIO MODELS CARRIER	CARRIER	"PRIVATE-LINE"	"PRIVATE-LINE"	"DIGITAL PRIVATE-LINE"	"DIGITAL PRIVATE-LINE"
	NUMBER OF OPERATING FREQUENCIES		1	2	1	2	1	2	1	2	1	2	1	2
KXN6121AA	CRYSTAL (XMTR)		X 2	X 2	X 2	X 2	X 2		X 2		X 2	X 2		
KXN6122AA	CRYSTAL (RCVR)		X 2	X 2	X 2	X 2	X 2		X 2		X 2	X 2		
TAE6052A	ROOF TOP ANTENNA KIT		◢	◢	◢	◢	◢	◢						
THN6321A	HOUSING KIT		X	X	X	X	X	X	X	X	X	X	X	X
TKN6794A	POWER CABLE		X	X	X	X	X	X	X	X	X	X	X	X
TMN6130A	MICROPHONE, MOBILE		X	X	X	X	X	X					X	X
TRN6005A	CODE PLUG						X	X						
TRN6905A	INSTALLATION KIT		X	X	X	X	X	X	X	X	X	X	X	X
TUE1443AB	UNIFIED CHASSIS (1-FREQ.)		X		X		X		X		X			
TUE1443AH	UNIFIED CHASSIS (2-FREQ.)			X		X		X		X		X		X
KLN6209A	"VIBRASPONDER" RESONANT REED				X	X			X	X				
TRN6904A	ENCODER/DECODER "PRIVATE-LINE"										X	X		
TRN6906A	ENCODER/DECODER "DIGITAL PRIVATE-LINE"												X	X
TRN6900A	HARDWARE KIT 2-FREQ. "PRIVATE-LINE"						X	X						
TRN6899A	HARDWARE KIT 1-FREQ. "PRIVATE-LINE"				X	X					X	X		
TRN6901A	HARDWARE KIT 2-FREQ. CARRIER SQUELCH)												X	X
TRN6902A	ESCUTCHEON (1-FREQ.)		X						X					
TRN6903A	ESCUTCHEON (2-FREQ.)			X		X		X		X		X		X
TMN1009A	DESK MICROPHONE (CARRIER SQUELCH)		X		X		X		X		X		X	
TPN1136A	POWER SUPPLY (117 V)								X	X				
TRN6223A	TRAY BASE								X	X	X	X	X	X
TMN1008A	DESK MICROPHONE ("PRIVATE-LINE")								X	X	X	X	X	X

EPS-23822-O

MOTOROLA

MODEL CHART

FOR

450-470 10 W RF POWER

UHF "MOXY" FM TWO-WAY RADIO

UNIFIED CHASSIS

[X] ONE ITEM SUPPLIED

ITEM	DESCRIPTION	MODEL: TUE1443AB	DESCRIPTION: UNIFIED CHASSIS	MODEL: TUE1443AH	DESCRIPTION: UNIFIED CHASSIS
TLE1863A	UHF POWER AMPLIFIER	X		X	
TL[illegible]A	RF DECK	X		X	
TLE4073A	MAIN CIRCUIT BOARD (1-FREQ.	X			
TLE4083A	MAIN CIRCUIT BOARD (2-FREQ.)			X	
TLN6993A	HARDWARE KIT	X		X	

EPS-23823-O

RADIO SET ACCESSORY TABLE

KIT NUMBER	DESCRIPTION
TMN6113A	HANDSET
TRN6319A	HANDSET HANG-UP BOX
TRN8026A	REVERSE EXCUTCHEON, 1 FREQ. RADIOS
TRN8027A	REVERSE EXCUTCHEON, 2 FREQ. RADIOS
TSN6025A	EXTERNAL SPEAKER
TRN6223A	BASE STATION MOUNTING TRAY WITHOUT MICROPHONE CLIP
TRN6318A	BASE STATION MOUNTING TRAY WITH MICROPHONE CLIP
TRN6524A	SECURITY MOUNTING HARDWARE
TRN6525A	RADIO-TO-TRUNNION QUICK MOUNTING SCREWS

FOREWORD

1. SCOPE OF MANUAL

This manual is intended for use by experienced technicians familiar with similar types of equipment. It contains all service information required for the equipment described and is current as of the printing date. Changes which occur after the printing date are incorporated by Instruction Manual Revisions (SMR). These SMR's are added to the manuals as the engineering changes are incorporated into the equipment.

2. MODEL AND KIT IDENTIFICATION

Motorola equipments are specifically identified by an overall model number on the nameplate. In most cases, assemblies and kits which make up the equipment also have kit model numbers stamped on them. When a production or engineering change is incorporated, revision suffix numerals are added to the affected kit model number. For example, a TLN4448A becomes a TLN4448A-1 with the first revision, TLN4448A-2 with the second revision, etc.

As diagrams are updated, information about the change is incorporated into a revision column. This revision column appears in the manual next to the parts list or, in some cases, on the diagram. It lists the reference number, part number, and description of the parts removed or replaced when the suffix number changed. With this information, the technician can find the information for the current version, and any previous version, of the equipment covered by the manual.

3. SERVICE

Motorola's National Service Organization offers one of the finest nation-wide installation and maintenance programs available to communication equipment users. This organization includes approximately 800 authorized Motorola Service Stations (MSS) located throughout the United States, each manned by one or more trained, FCC licensed technicians.

These MSS's are independently owned and operated and were selected by Motorola to service its customers. Motorola maintenance is available on either a time and material basis or on a periodic fixed-fee type arrangement.

The administrative staff of this organization consists of national, area and district service managers and district representatives, all of whom are Motorola employees with the objective to improve the service to our customers.

Should you wish to purchase a service contract for your Motorola equipment, contact your Motorola Service Representative, or write to:

National Service Manager
Motorola Communications Division
1303 E. Algonquin Road
Schaumburg, Illinois 60196

4. REPLACEMENT PARTS ORDERING

Motorola maintains a number of parts offices strategically-located throughout the United States. These facilities are staffed to process parts orders, identify part numbers, and otherwise assist in the maintenance and repair of Motorola Communications Division products.

Orders for all parts *except* crystals, channel elements, and "Vibrasender" ® and "Vibrasponder" ® resonant reeds should be sent to the nearest area parts center. Orders for instruction manuals should also be sent to the area parts center.

When ordering replacement parts or equipment information, the complete identification number should be included. This applies to all components, kits, and chassis. If the component part number is not known, the order should include the number of the chassis or kit of which it is a part, and sufficient description of the desired component to identify it.

Orders for crystals, channel elements, active filters, code plugs, and reeds should be sent directly to the factory address listed on the following page. Crystal and channel element orders should specify the crystal or channel element type number, crystal and carrier frequency, and the chassis model number in which the part is used.

Orders for active filters, code plugs, "Vibrasender" and "Vibrasponder" resonant reeds should specify type number and frequency, and should identify the owner/operator of the communications system in which these items are to be used.

5. ADDRESSES

5.1 GENERAL OFFICES

MOTOROLA, INC.
Communications Group Parts Dept.
1313 E. Algonquin Rd.,
Schaumburg, Illinois 60196
Phone: 312-576-6521
Executive Offices: 1303 E. Algonquin Rd.,
Schaumburg, Illinois 60196

5.2 U.S. ORDERS

WESTERN AREA PARTS
1170 Chess Drive, Foster City,
San Mateo, California 94404
Phone: 415-349-3111
TWX: 910-375-3877

MIDWEST AREA PARTS
10 W. North Ave.,
Lombard, Ill. 60148
Phone: 312-620-3000
TWX: 910-693-1592

MID-ATLANTIC AREA PARTS
6701 Elkridge Landing Road,
Linthicum, Maryland 21090
Phone: 301-796-8600

EAST CENTRAL AREA PARTS
12995 Snow Road,
Parma, Ohio 44130
Phone: 216-267-2210
TWX: 810-421-8845

EASTERN AREA PARTS
85 Harristown Road,
Glen Rock, New Jersey 07452
Phone: 201-447-4000
TWX: 710-988-5602

PACIFIC SOUTHWESTERN AREA PARTS
2333 Utah Avenue,
El Segundo, California 90245
Phone: 213-644-1101
TWX: 910-348-6278

SOUTHWESTERN AREA PARTS
3320 Belt Line Road,
Dallas, Texas 75234
Phone: 214-241-2151
TWX: 910-860-5505

SOUTHEASTERN AREA PARTS
5096 Panola
Industrial Blvd.
Decatur, Georgia 30032
Phone: 504-981-9800
TWX: 810-751-8300

5.3 CANADIAN ORDERS

CANADIAN MOTOROLA ELECTRONICS COMPANY
Parts Department
3125 Steeles Avenue, East M2H 2H6
Willowdale, Ontario
Phone: 416-499-1441
TWX: 610-492-2713
Telex: 065-25191

5.4 ALL COUNTRIES EXCEPT U.S. AND CANADA

MOTOROLA, INC. OR MOTOROLA AMERICAS, INC.
International Parts Dept.
1313 E. Algonquin Road
Schaumburg, Illinois 60196 U.S.A.
Phone: 312-576-6492
TWX: 910-693-1592 or 1599
Telex: 722443 or 722424
Cable: MOTOL

5.5 FACTORY ADDRESS FOR CRYSTAL, CHANNEL ELEMENT, ACTIVE FILTER, CODE PLUGS AND RESONANT REED ORDERS

AIR MAIL ORDERS
Motorola, Inc.
Component Products Sales & Service
P.O. Box 66191
O'Hare International Airport
Chicago, Ill. 60666

REGULAR MAIL ORDERS AND CORRESPONDENCE
Motorola, Inc.
Component Products Sales & Service
2553 N. Edgington Street
Franklin Park, Illinois 60131

OPERATOR'S INSTRUCTIONS

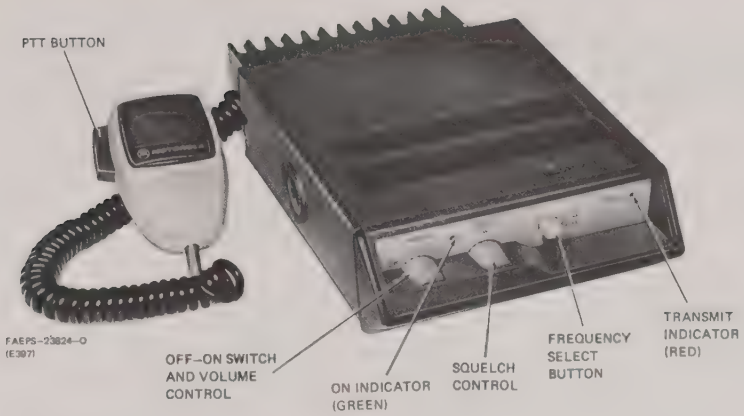


Figure 1. Operating Controls and Indicators

1. TO TURN ON RADIO

The on-off switch for the radio set is operated by the OFF-VOLUME control. To turn on the radio set, rotate the OFF-VOLUME control knob clockwise until a click is heard. The front panel lamp then turns on to illuminate the control labels and the green ON indicator.

2. TO RECEIVE

OPERATION	PROCEDURE
1. Disable PL (PL models only)	Remove microphone from hang-up clip.
2. Unsquelch radio	Turn SQUELCH control counterclockwise until noise is heard.
3. Set VOLUME control	Adjust VOLUME control for a comfortable listening level.
4. Set SQUELCH control	Turn SQUELCH control clockwise until noise just stops.
5. Select operating frequency. (Two-frequency models only)	Press frequency button, as needed. Pressed to the (latching) in position selects F2; released to the out position selects F1.
The radio is now adjusted to receive *all* messages on the selected frequency	
6. Enable PL (PL models only)	Insert microphone into hang-up clip.
You are now able to hear messages for your system only.	

3. TO TRANSMIT

OPERATION	PRODEDURE
1. Disable PL (PL models only)	Remove microphone from hang-up clip.
2. Select operating frequency (Two-frequency models only)	Press frequency button, as needed. Pressed to the (latching) in position selects F2; released to the out position select F1.
3. LISTEN	DO NOT TRANSMIT if anyone is using the channel.
4. Key transmitter	Press and hold down microphone PTT button. Red light on radio front panel will glow indicating that the transmitter is "on-the-air".
5. Transmit message	Hold microphone about 2 inches from your lips and speak slowly into microphone at a normal voice level. Shouting will not make your message easier to understand. Make each transmission as brief as possible.
6. Receive reply	Release microphone PTT button.
7. Enable PL at end of conversation (PL models only)	Insert microphone into hang-up clip.

PREINSTALLATION INSTRUCTIONS

1. UNPACKING

When unpacking the radio from its shipping carton, refer to the model chart at the front of this manual. If any item is missing, contact your Motorola representative immediately.

2. LICENSING REQUIREMENTS

FCC regulations state that a station license must be obtained for each radio installation (mobile or base) by the owner of the equipment. The station licensee is responsible for ensuring that the transmitter power, frequency, and deviation are within the limits permitted under the station license. Adjustments to the transmitter section of the radio may be made only by a technician possessing an FCC commercial operator's license. No license is required to install, check out, or operate the radio.

3. BENCH CHECK

3.1 INTRODUCTION

Each radio set is adjusted, tested, and inspected before shipment. However, it is recommended that both the transmitter and receiver sections of the radio be checked for proper operation just prior to installation.

3.2 TESTING

The radio should be tested with all cables and accessories supplied with the radio connected as they will be in the final installation. The frequency, deviation, and output of the transmitter should be checked, as well as the sensitivity, squelch operation, and audio quality of the receiver. Radios with PL or DPL capabilities should be operated in that mode to verify proper encode/decode performance. Refer to the Specifications page at the front of this manual to determine whether the radio is operating properly. Improper operation can generally be corrected by touching up the receiver or transmitter alignment.

3. INSTALLATION PLANNING— MOBILE RADIOS

3.1 GENERAL

Planning is the key to fast, easy radio installation. Before a hole is drilled or a wire is run, inspect the vehicle and determine how and where you intend to mount the antenna, radio set and accessories. Plan wire and cable runs to provide maximum protection from pinching, crushing, and overheating.

3.2 ANTENNA MOUNTING

The best mounting location for the antenna is in the center of a large, flat conductive surface. In almost all vehicles these requirements are best satisfied by mounting the antenna at the center of the roof. Some vehicles have a large trunk lid that will provide a good antenna location. If the trunk lid is used, connect grounding straps between the trunk lid and vehicle chassis to insure that the trunk lid is at chassis ground.

3.3 RADIO MOUNTING

3.3.1 General

The trunnion mount allows the radio set to be mounted to a variety of mounting surfaces. Be sure the mounting surface is able to adequately support the weight of the radio. Allow sufficient space around the radio for free air flow for cooling. Be sure the unit is close enough to the vehicle operator to permit easy access to the operating controls.

3.3.2 Inverted Escutcheon Installation

A front panel escutcheon with inverted lettering (Motorola Option B96) is available if you plan to mount the radio above the operator's normal line of sight. Install the inverted escutcheon as follows:

Step 1. Remove the radio chassis from its housing.

Step 2. Using a long screwdriver, push on the back of the upright escutcheon until it is free of the radio housing front panel.

Step 3. Remove the tape from the back of the inverted escutcheon. Press the inverted escutcheon onto the radio housing front panel.

Step 4. Pull the pushbutton off the frequency selection switch. Invert the pushbutton and replace it on the switch.

Step 5. Reinstall the radio chassis into the housing. Be sure the chassis locking tabs properly engage the slots in the housing.

3.4 DC POWER AND WIRING

3.4.1 This radio must be operated only in negative-ground electrical systems. Reverse polarity will not damage the radio, but the cable fuse will blow. Check the vehicle ground polarity before you begin installation to prevent wasted time and effort.

3.4.2 Connect the red power lead through F901 to the vehicle battery positive terminal. Connecting the red lead to any other positive voltage point in the vehicle is not recommended.

CAUTION

If dc power is to be controlled by the vehicle ignition switch, a switching relay (Motorola Part No. 59-813674) should be used to switch the red power lead. The vehicle ignition switch, then, controls dc to the relay coil.

3.4.3 Connect the black power lead to a good ground point on the vehicle chassis. Do not connect the black lead directly to the battery negative terminal.

3.4.4 The wiring provided with the radio is of sufficient size to handle the maximum radio current demand. If wiring must be added to that provided, be sure the gauge of the added wire is sufficient for the current to be carried the length of the added run.

4. INSTALLATION PLANNING— BASE STATIONS

4.1 ANTENNA SYSTEM

Selecting the antenna system for your base radio depends on factors beyond the scope of this manual. Your Motorola representative can help you choose the antenna system that will best serve your particular needs.

4.2 RADIO LOCATION

Choose a location for your base radio as close as possible to where the antenna cable enters the building. Be sure 117 volt, 60 Hz power is available. Make sure sufficient air can flow around the radio to permit adequate cooling.

INSTALLATION INSTRUCTIONS

1. MOBILE RADIOS

Step 1. Mount the antenna, using the instructions provided with the antenna kit. Run the coaxial cable to the intended radio set mounting location. Cut off the excess cable and install the cable connector.

Step 2. Route power wiring, but do not make power connections and do not tie the wires down. Be sure to use a grommet wherever the wiring must pass through a metal panel.

Step 3. Mount the radio set trunnion mounting bracket. See Figure 2.

Step 4. Mount the microphone hang-up clip. If the surface on which the clip is mounted is not connected to the auto chassis, run the black grounding wire (supplied) to the nearest convenient ground point.

Step 5. Connect the power plug and coaxial cable connector to the radio set. See Figure 3. Install the radio in the trunnion mounting bracket.

Step 6. Complete the power wire installation. Be sure to leave sufficient slack wire behind the radio set to make the unit easy to remove and reinstall. Strap the wire down where necessary, making sure the wires do not make contact with hot areas on the engine. Be sure the wires cannot be snagged by the operator's feet during normal vehicle operation. Cut off the excess power lead length and attach the terminal lugs supplied.

Step 7. If the speaker external speaker is used, secure wiring to those items as needed. Allow sufficient slack in wiring for future maintenance.

Step 8. Connect the power leads. Be sure the connection points are clean and free of paint, dirt, and corrosion.

Step 9. Test radio and its accessories for proper system operation. Check the antenna SWR; an SWR of 2.5:1 or less is satisfactory.

NOTE

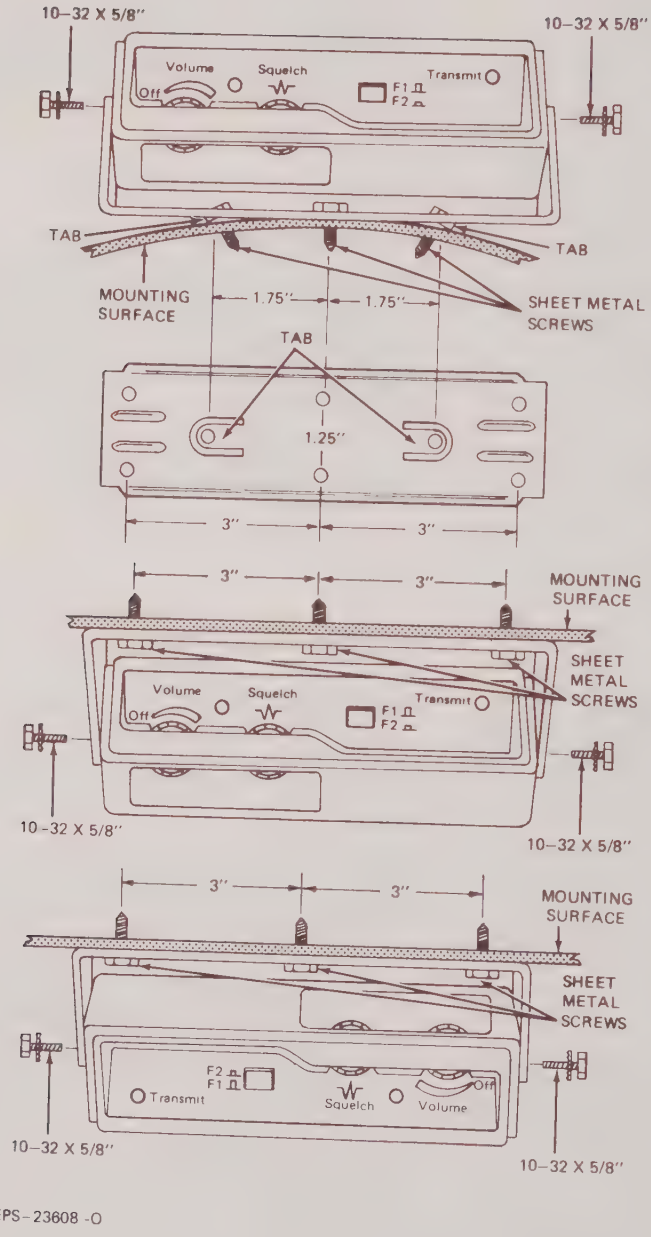
After installation, remove the protective film from the escutcheon. To remove any dust accumulation from the escutcheon, wipe with a damp cloth.

2. BASE STATIONS

Step 1. Mount the radio set to the base mounting tray.

Step 2. Prepare radio set power leads as follows: Attach the provided pins to the ends of the red and black power leads. Insert power leads into the mating plug of the base station power supply output jack; red lead pin into position 4 and the black lead pin into position 1. (See Fixed Station Power Supply section of this manual.)

Step 3. Connect an in-line SWR meter between the radio antenna connector and the antenna system.



TRANSMISSION HUMP MOUNTING

MOUNTING TRUNNION

(MOTOROLA PART NO. 7–8313K01) ALL HOLES .203" DIAMETER. SECURE TRUNNION TO MOUNTING SURFACE WITH NO. 10 X 3/4" SHEET METAL SCREWS (SUPPLIED) OR EQUIVALENT.

BELOW–DASH MOUNTING

OVERHEAD MOUNTING WITH INVERTED ESCUTCHEON

BEPS–23608 –O

Figure 2. Radio Mounting Detail

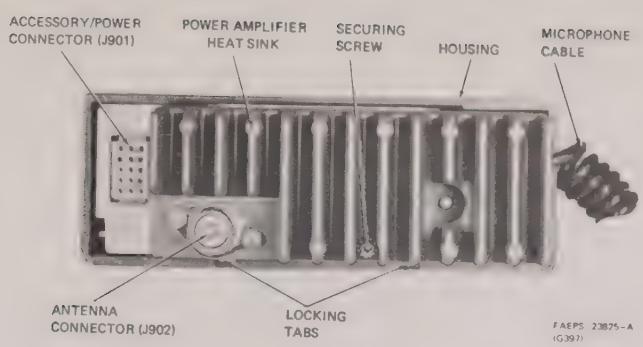


Figure 3. Connections to Radio Set Rear Panel

Step 4. Plug the base dc power supply into the 117 volt, 60 Hz outlet. Set the AC POWER switch on the power supply to the ON POSITION.

Step 5. Key the transmitter and check the antenna system SWR. If the SWR is 2.5:1 or lower, disconnect the SWR meter and connect the antenna coaxial cable to the radio set antenna jack. (An SWR in excess of 2.5 indicates a problem in the antenna system. Make sure the proper antenna is being used, and check all cabling and connections.)

Step 6. Test the radio set and accessories for proper operation. A brief conversation with a mobile unit in your system will indicate whether the base station is operating satisfactorily.

NOTE

After installation, remove the protective film from the escutcheon. To remove any dust accumulation from the escutcheon, wipe with a damp cloth.

SERVICE

1. INTRODUCTION

This radio is designed for easy servicing. Numerous test points are provided on the radio circuit board. For servicing information refer to the schematic diagrams, circuit board details; and alignment procedures in this manual. Theory of operation is shown on the schematic diagrams.

2. HOUSING REMOVAL

(Refer to Figure 3)

Step 1. Remove the screws that hold the radio set in the trunnion mount.

Step 2. Insert a screwdriver blade into the screwdriver slot near the bottom of the radio chassis rear panel.

Step 3. Push the screwdriver against the housing until the chassis locking tabs clear the slots in the radio housing.

Step 4. Slide the radio chassis out the back of the housing.

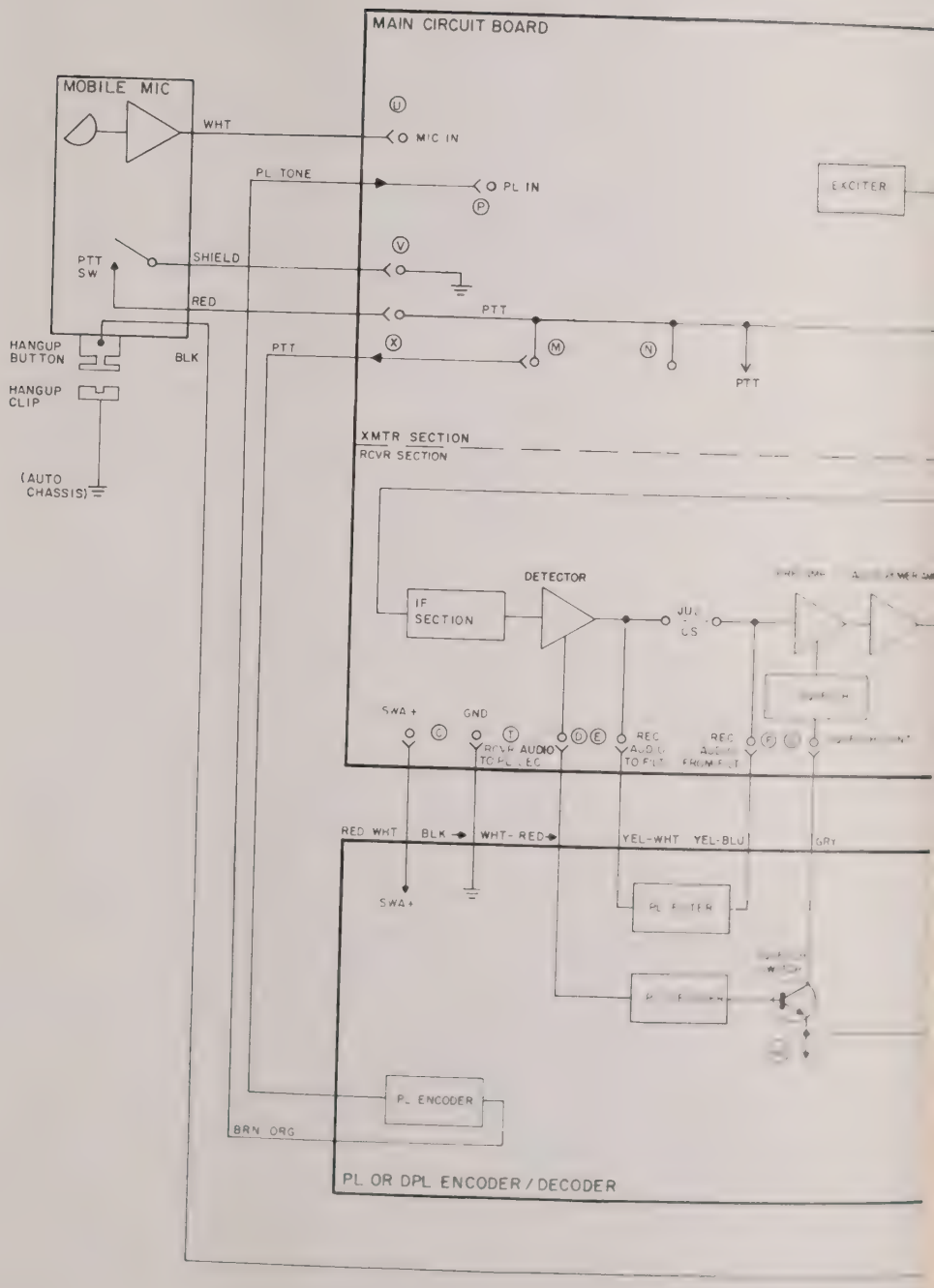
3. WIRE REPLACEMENT— ACCESSORY/POWER PLUG P901

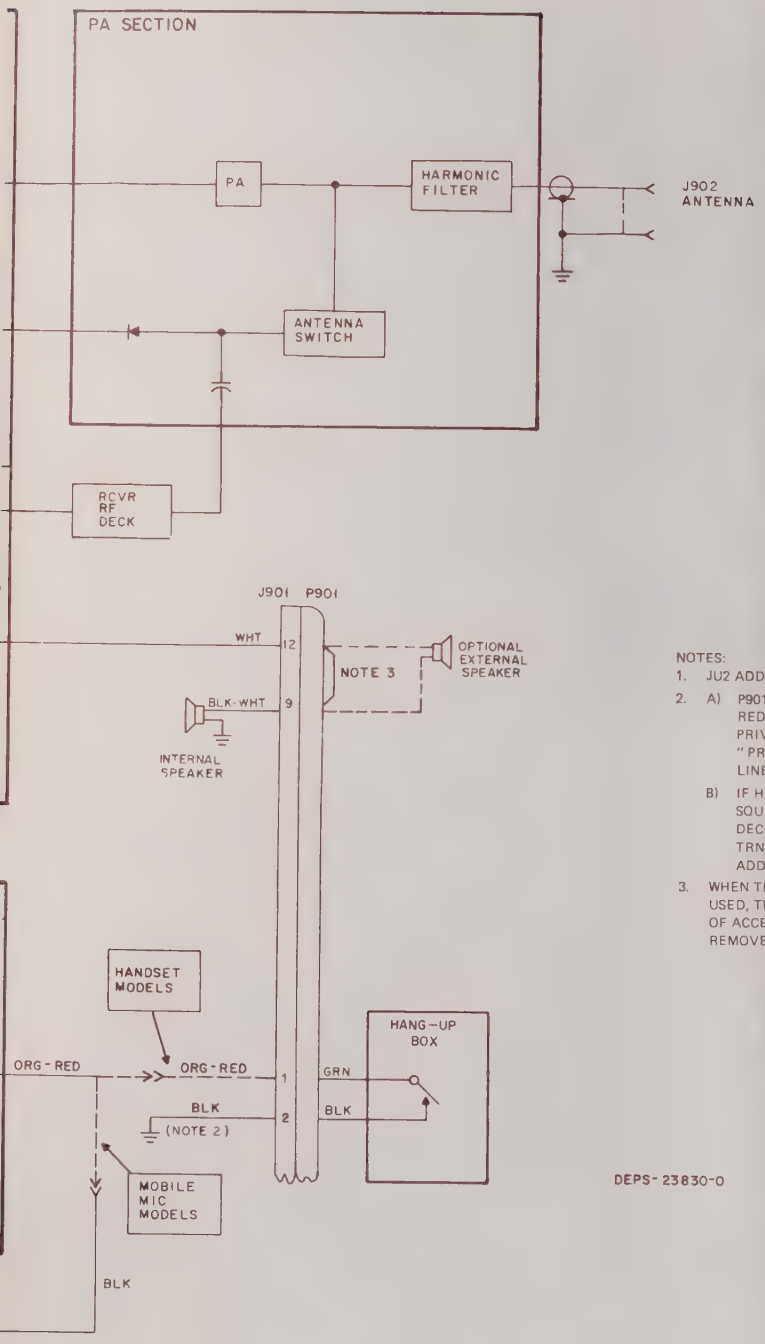
A special wire extraction tool (Motorola model number ST1145) is available to remove wires from accessory/power plug P901. The tool must be used for ease of wire extraction and to prevent damage to the connector or its pins.

4. REQUIRED TEST EQUIPMENT FOR "MOXY" RADIO SERVICING

GENERAL TYPE	APPLICATION	RECOMMENDED MODEL	MIN. SPECIFICATIONS
AC-DC VOM	DC voltage measurements, general	Motorola T1009A	Measurement range: 0-15 V dc Sensitivity: 20,000 ohms/volt
DC Multimeter	DC voltage readings requiring a high input resistance meter.	Motorola S1063B	Measurement range: 0-15 V dc Input resistance: 11 megohms
AC Voltmeter	Audio voltage measurements	Motorola S1053C	Measurement range: 0-10 V ac Input resistance: 10 megohms
RF Voltmeter	RF voltage measurements	Motorola S1339A	Measurement range: 100 uV – 3 V from 1 MHz - 512 MHz Inputs: 50 ohm and high impedance
Oscilloscope	Waveform observation	Telequipment Model D61	Vertical sensitivity: 10 mV - 10 V/division Horizontal time base: 1 usec – 1 sec/division
RF Wattmeter	Transmitter output power measurement	Motorola S1350A with appropriate element and T1013A RF Dummy Load	Measurement range: 0-25 Watts
Frequency Meter	Transmitter frequency meausrement	Motorola S1327 Series, S1343 Series, or S1344 Series	Measurement range: 450-470 MHz Frequency resolution: 10 Hz
Deviation Meter	Transmitter modulation deviation measurement	Motorola S1323A or Motorola S1325A	Measurement range: 0-10 kHz deviation Frequency Range: 450-470 MHz
RF Signal Generator	Receiver alignment and troubleshooting	Motorola S1329A	Frequency Range: 450-470 MHz Output Level: 0.1 uV-100,000 uV Must be capable of at least ± 3 kHz deviation when modulated by 1 kHz tone
Audio Signal Generator	Audio circuit troubleshooting	Motorola S1067A	Frequency Range: 20 Hz - 20 kHz Output Level: 50 mV - 1 V
PL Tone Generator*	Tone-Coded "Private-Line" Decoder troubleshooting	Motorola SLN6221A	Frequency Range: 50 Hz - 200 Hz Output Level: 0-500 mV
DPL Test Set **	"Digital Private-Line" Encoder-Decoder Troubleshooting	Motorola SLN6413A	
10.7 MHz Signal Source	Adjustment of receive freq.		1 mV output
Tuning Tool Kit	Receiver and transmitter alignment	Motorola TRN6210A	

* Required for tone-coded "Private-Line" Models only
** Required for "Digital Private-Line" Models only


MAIN CIRCUIT BOARD
MOBILE MIC
WHT
MIC IN
PL TONE
PL IN
EXCITER
PTT SW
SHIELD
RED
PTT
HANGUP BUTTON
BLK
PTT
HANGUP CLIP
(AUTO CHASSIS)
XMTR SECTION
RCVR SECTION
DETECTOR
IF SECTION
SW A +
GND
RED WHT
BLK
WHT- RED
YEL-WHT
YEL-BLU
GRY
PL ENCODER
BRN ORG
PL OR DPL ENCODER / DECODER

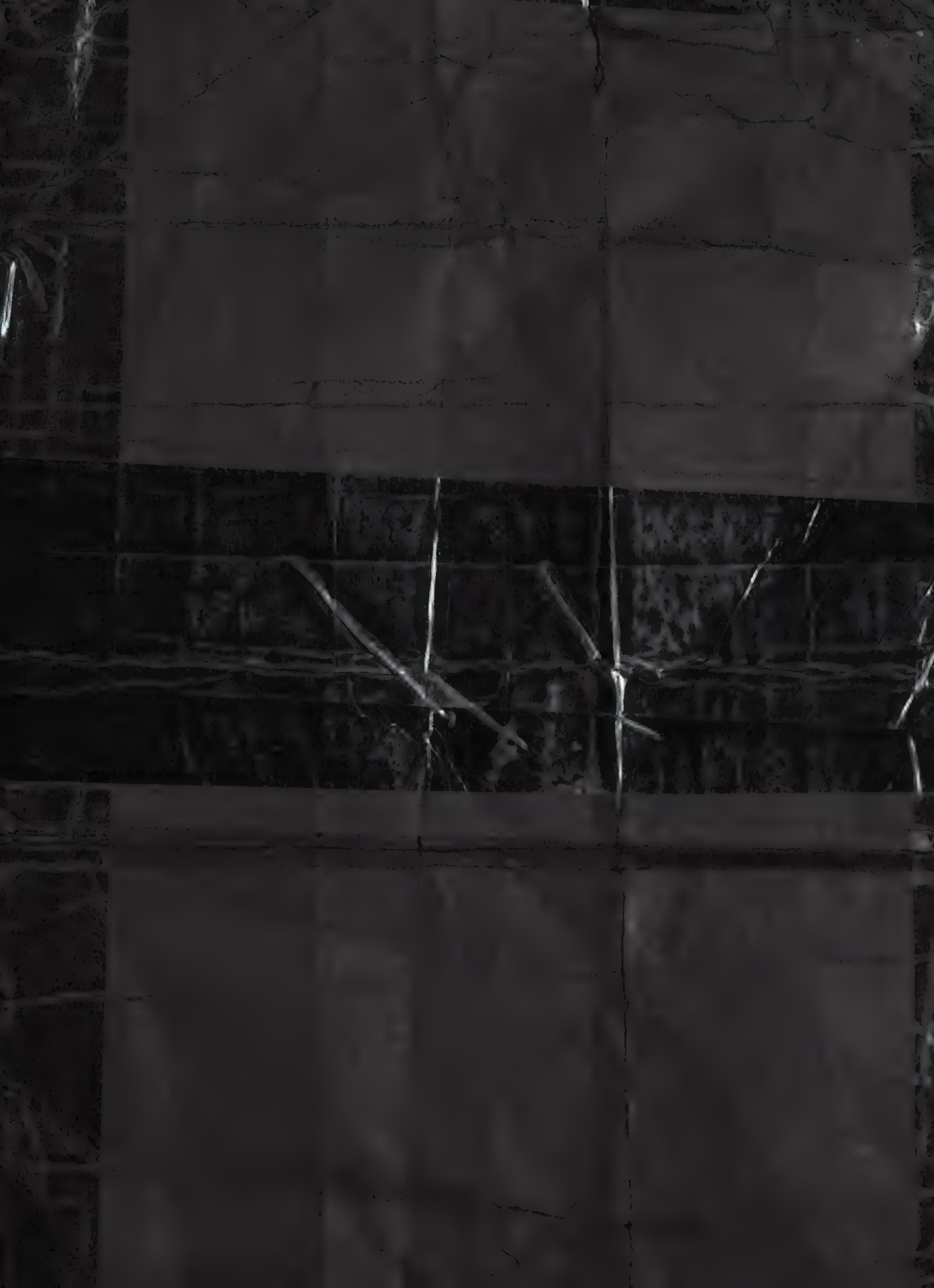


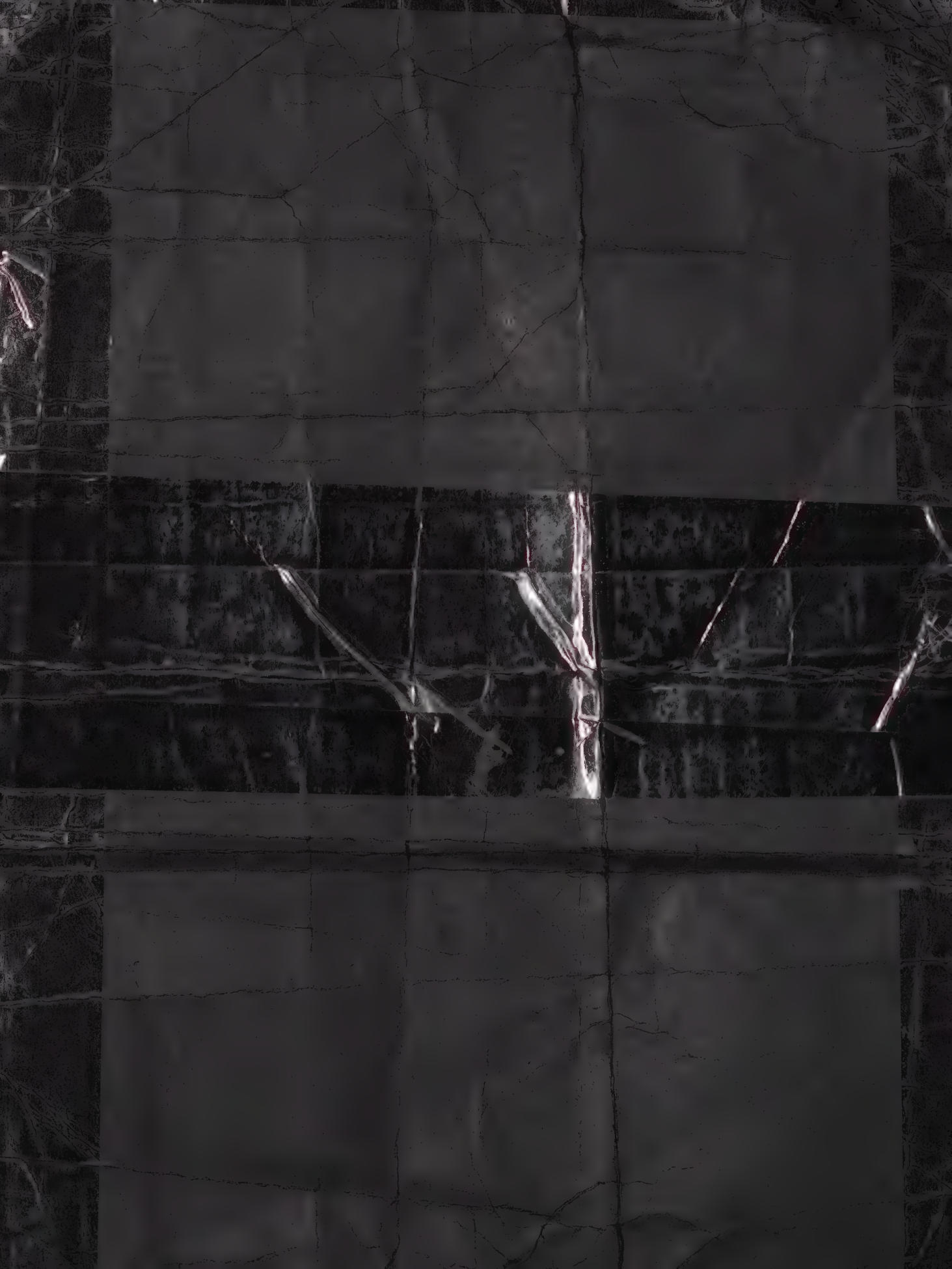
NOTES:

1. JU2 ADDED FOR CARRIER SQUELCH RADIOS.
2. A) P901–2 RETURNED TO GROUND VIA BLK–RED LEAD TO "PRIVATE–LINE" OR "DIGITAL PRIVATE LINE" ENCODER BOARD ON "PRIVATE–LINE" AND "DIGITAL PRIVATE–LINE" MODELS.
   B) IF HANG UP BOX IS USED WITH CARRIER SQUELCH RADIO (TO RESET OPTIONAL DECODER), GROUND RETURN WIRE (P/O TRN6209A GROUND WIRE KIT) MUST BE ADDED FROM P901–2 TO CHASSIS.
3. WHEN THE OPTIONAL EXTERNAL SPEAKER IS USED, THE JUMPER BETWEEN PINS 9 AND 12 OF ACCESSORY/POWER CONNECTOR P901 IS REMOVED.

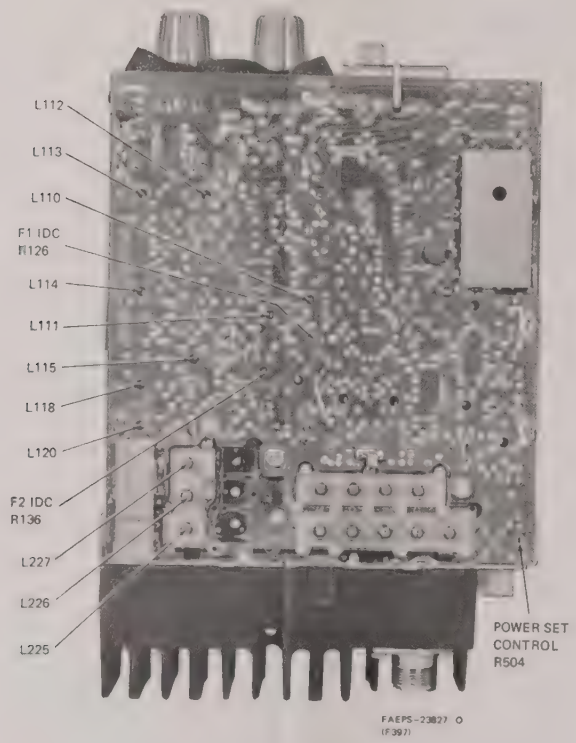
DEPS-23830-O

Radio Set
Functional Interconnect Diagram
Motorola No. DEPS-23830-O
5/27/77-NPC





TRANSMITTER ALIGNMENT PROCEDURE



TRANSMITTER METER READINGS WITH 20,000 OHM/VOLT VOLTMETER

METERING FUNCTION	VOLTMETER LEAD CONNECTIONS +	VOLTMETER LEAD CONNECTIONS −	VOLTMETER SCALE	TYPICAL READING
TP3 Buffer Ampl. Input	TP3	Chassis Ground	50 uA, DC	8 uA min. 15 typ.
TP5 Exciter Output Amplifier Collector Current	SW A +	TP5	100 mA, DC	24 mA Set
TP7 PA Current	SW A +	TP7	100 mA, DC	15 mA typ. 17 max.

PREALIGNMENT NOTES

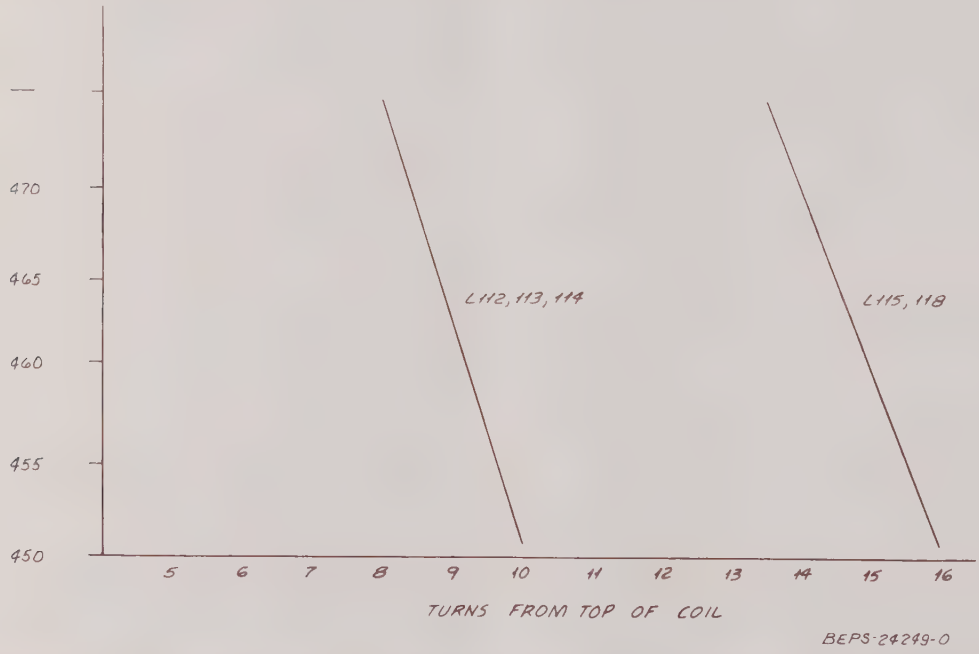
1. In some cases, peak readings may occur at two points in the tuning of a coil. Always choose the peak where the slug is nearest the top of coil form (away from circuit board).

2. Unnecessary tuning adjustments should be avoided. Usually, only a "touch-up" transmitter alignment is needed. Complete transmitter alignment is needed in the following cases:

   a. After changing transmitter operating frequency.
   b. After replacing a component in a frequency-sensitive network.

3. Before beginning a complete alignment, preset tuning adjustments as follows:

   a. Set L120 10 turns from top of form.
   b. Set L110 (and L111 in 2-frequency models) 7 turns from circuit board. (Low or no TP3 reading will be obtained if L110 and L111 are not properly preset.)
   c. Starting with slugs of L225, 226, and 227 flush with tension nut, set slugs 6 turns above nut.
   d. Set L112, L113, L114, L115, and L118 according to the following chart:



   e. Set power set control R804 fully counterclockwise (viewed from solder side of board) for maximum xmtr power output.

4. Key transmitter for each step in alignment procedure and de-key after alignment step is completed. Avoid keying an unaligned transmitter for prolonged periods.

5. Two-frequency radios should be aligned on the lower operating frequency.

6. Transmitter frequency calculations:
   $f_c = 27f_{osc}$, where f_c = carrier frequency, and f_{osc} = crystal oscillator frequency.

SET-UP

1. Metering may be accomplished with a 20,000 ohm-per-volt voltmeter. Refer to the metering table on this page.

2. Connect an rf wattmeter, terminated in a resonant antenna or 50-ohm resistive dummy load, to radio set antenna connector J902.

3. Connect a dc power supply to accessory/power connector J901. Set the power supply output to 13.8 volts.

TRANSMITTER ALIGNMENT

NOTE
Two-Frequency radios should be tuned on lowest frequency.

STEP	TEST POINT	ADJUSTMENT	DESIRED READING
1 Oscillator Output	TP3	L112, then L113	Peak
2 Buffer Output	TP5 TP3	L114	Peak is TP5 has a reading. Dip if no TP5 reading.
3 First Tripler Output	TP5	L115, then L118	Peak
4 Second Tripler Input	TP5	L120	Peak on wattmeter or 24 uA max at TP5
5 Second Tripler Output Filter	Wattmeter	L225,226,227	Peak
6 Repeat all of the adjustments made to this point			
7 Oscillator Output	Wattmeter	L112	Detune for a reading of 5 watts
8 Second Tripler Input	Wattmeter	L120	Peak
9 Oscillator Output	TP3	L112	Peak
10 Repeat Step 5			

For widespaced operation (greater than 2MHz separation between transmit frequencies on two-frequency radios), go to step 11A, otherwise, go to step 12.

NOTE
STEPS 11A, B, C, AND D ARE FOR WIDE-SPACED FREQUENCY OPERATION ONLY

STEP	TEST POINT	ADJUSTMENT	DESIRED READING
11A	TP3	L112	Peak on higher frequency
11B	TP5	L115	Peak on higher frequency
11C	TP3	L114	Peak on lower frequency
11D	Wattmeter	L225	Peak on higher frequency
12 Power Output	Wattmeter	R804	Adjust R804 to reduce power output to 11 watts. For widespaced operation, set R804 so that the channel with the lowest power output is 11 watts. (See note)

NOTE

If the maximum power output obtainable is less than 11 wa
procedure and repeat the alignment a second time. If th
below 11 watts, proceed as follows:

IF MAXIMUM IS BETWEEN 10 AND 11 WATTS:
Set R804 so that power output just begins to drop (less than 1

IF MAXIMUM IS LESS THAN 10 WATTS:
The transmitter may be malfunctioning. Refer to the transmi
formation.

OSCILLATOR FREQUENCY

Oscillators should be set on frequency AFTER transmitter has bee

SET-UP

1. Set up the frequency meter or counter controls as required.

2. In tone-coded "Private-Line" (PL) radios, remove the "Vibr
board.
In "Digital Private-Line" (DPL) radios, disable the DPL enc
pads on the DPL board.

FREQUENCY ADJUSTMENT PROC

STEP	PROCEDURE
1	Select F1
2	Key transmitter with n
3	Adjust L110 for F1 fre
	Two-Frequency Mode
4	Select F2
5	Adjust L111 for F2 fre

IDC ADJUSTM

NOTE

Oscillator frequency adjustment must be made

SET-UP

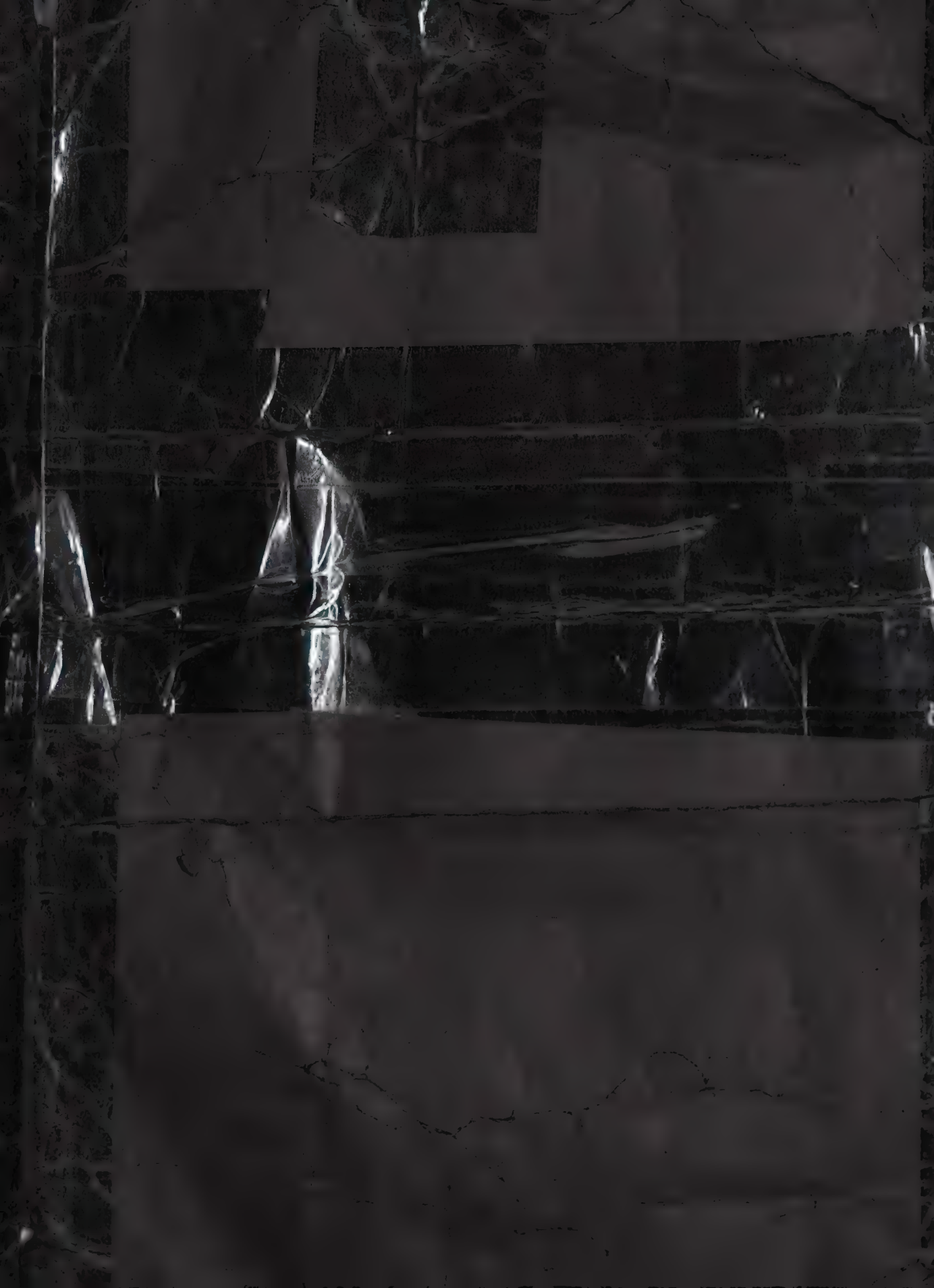
1. Set the deviation meter operating controls as needed.

2. In tone-coded "Private-Line" radios, remove the "Vibras
board.
In "Digital Private-Line" radios, disable the DPL encoder b
on the DPL board.

3. Disconnect the microphone white wire from pin U. Connect t

   - High side through a 1 uF capacitor (+ end toward the radio
   - Low side to radio chassis.

4. Connect an ac VTVM across the audio signal generator outpu



tts, go back to step 2 of the exciter alignment
e maximum obtainable power output is still

/2 watt).

tter schematic diagram for troubleshooting in-

ADJUSTMENT

n aligned and BEFORE modulation deviation is set.

asponder" resonant reed from its socket on the PL

oder by shorting together the "code disable" plating

EDURE

o modulation
quency ± 100 Hz
ls Only
quency ± 100 Hz

ENT

BEFORE setting the IDC controls.

ponder" resonant reed from its socket on the PL

y shorting together the "code disable" plating pads

he output of an audio signal generator as follows:

) to pin U.

t.

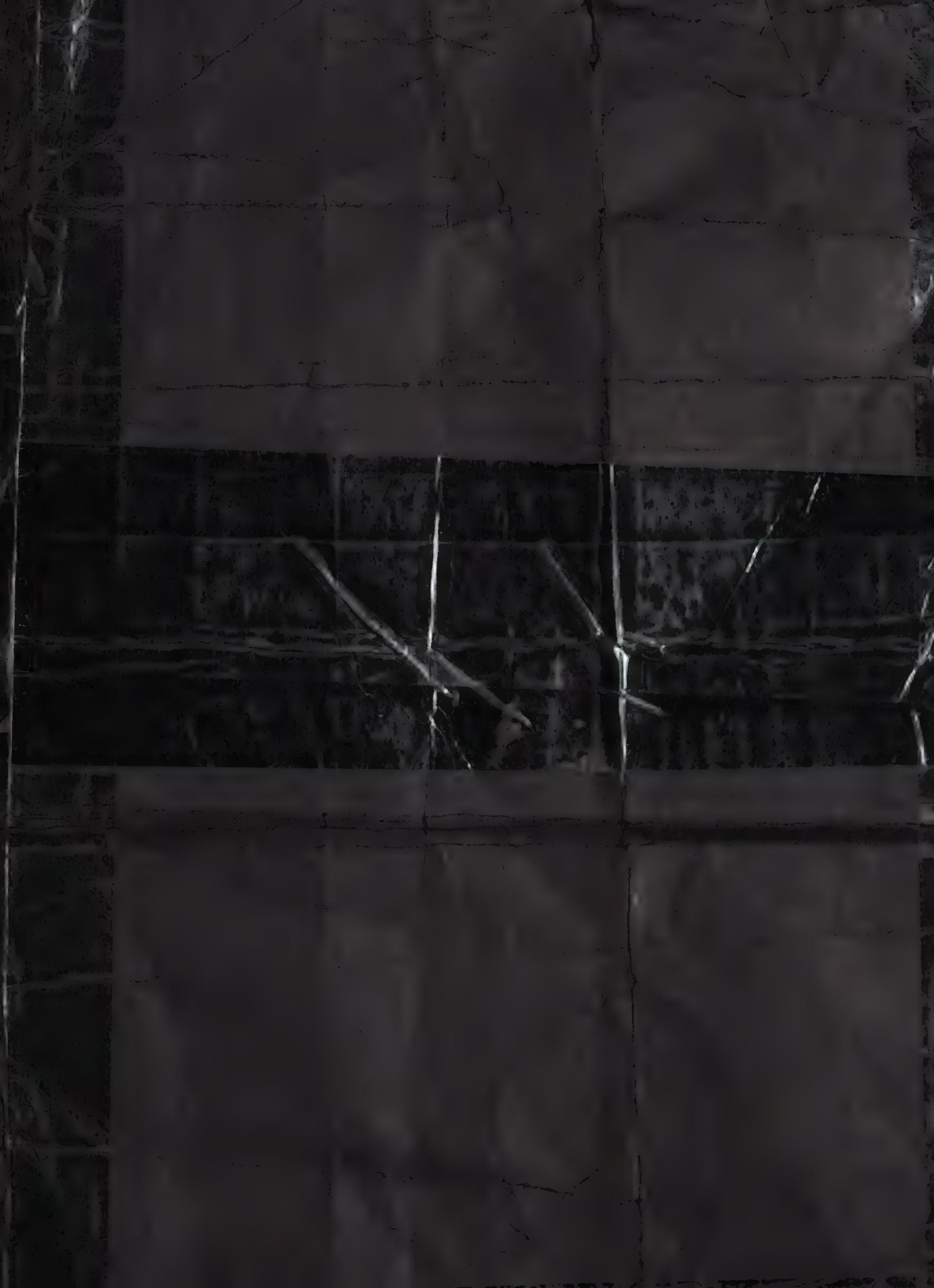
)JUSTMENT PROCEDURE

:P	PROCEDURE
	Set audio signal generator output frequency to 1000 Hz
	Select F1 and key transmitter. Adjust F1 "IDC" contr reading.
	On 2-freq. models, select F2 and key transmitter. Adju deviation meter reading.
	Reduce audio signal generator output level until deviati oscillator output level should be 160 mV ± 3 dB.
	TONE CODED "PRIVATE-LINE"
	Insert resonant reed into socket on PL board and disco
	Key transmitter and adjust Tone Level control R433 fo
	Reconnect audio signal generator (See set-up step 3) an Be sure overall deviation does not exceed ± 5 kHz, incl
	Reconnect white wire to pin U.
	"DIGITAL PRIVATE-LINE" MODEL
	Disconnect the audio signal generator.
	Key the transmitter and adjust Code Level set control R ing of 900 Hz.
	Reconnect the audio signal generator (See set-up step 3) 3 above. Be sure overall deviation does not exceed ± 5 k
	Reconnect white wire to pin U.

NOTE

DEVIATION MEASU

To obtain measurement of the transmitter deviation in ra binary-coded squelch, the frequency response of the devia below 1 Hz. If a deviation meter with this low frequency transmitter deviation can be checked by making the transn measurement. Standard test equipment will then provid make the transmitter send continuous sine wave, short to Inverter Q309 and cut the jumper between C322 and groun whenever the transmitter is keyed. (The transmitter can b button or shorting pin X to the radio chassis.) When IDC and unshort Q309.



and output level to 0.8 V.

l R126 for ± 5 kHz deviation meter

F2 "IDC" control R136 for ± 5 kHz

on meter reads ± 3.0 kHz. Audio

MODELS ONLY

nnect audio signal generator.

PL tone deviation reading of 800 Hz.

repeat steps 1 through 3.
ding PL tone.

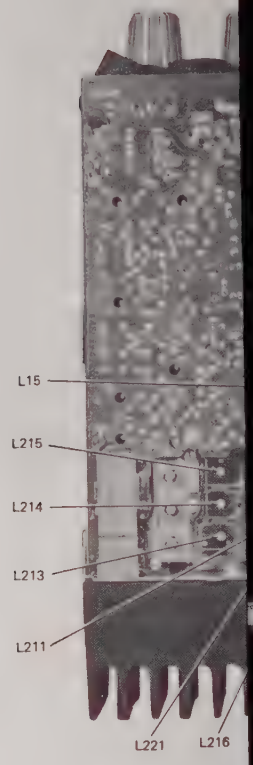
S ONLY (SEE NOTE)

342 for DPL code deviation read-

and repeat steps 1 through
Hz, including DPL code.

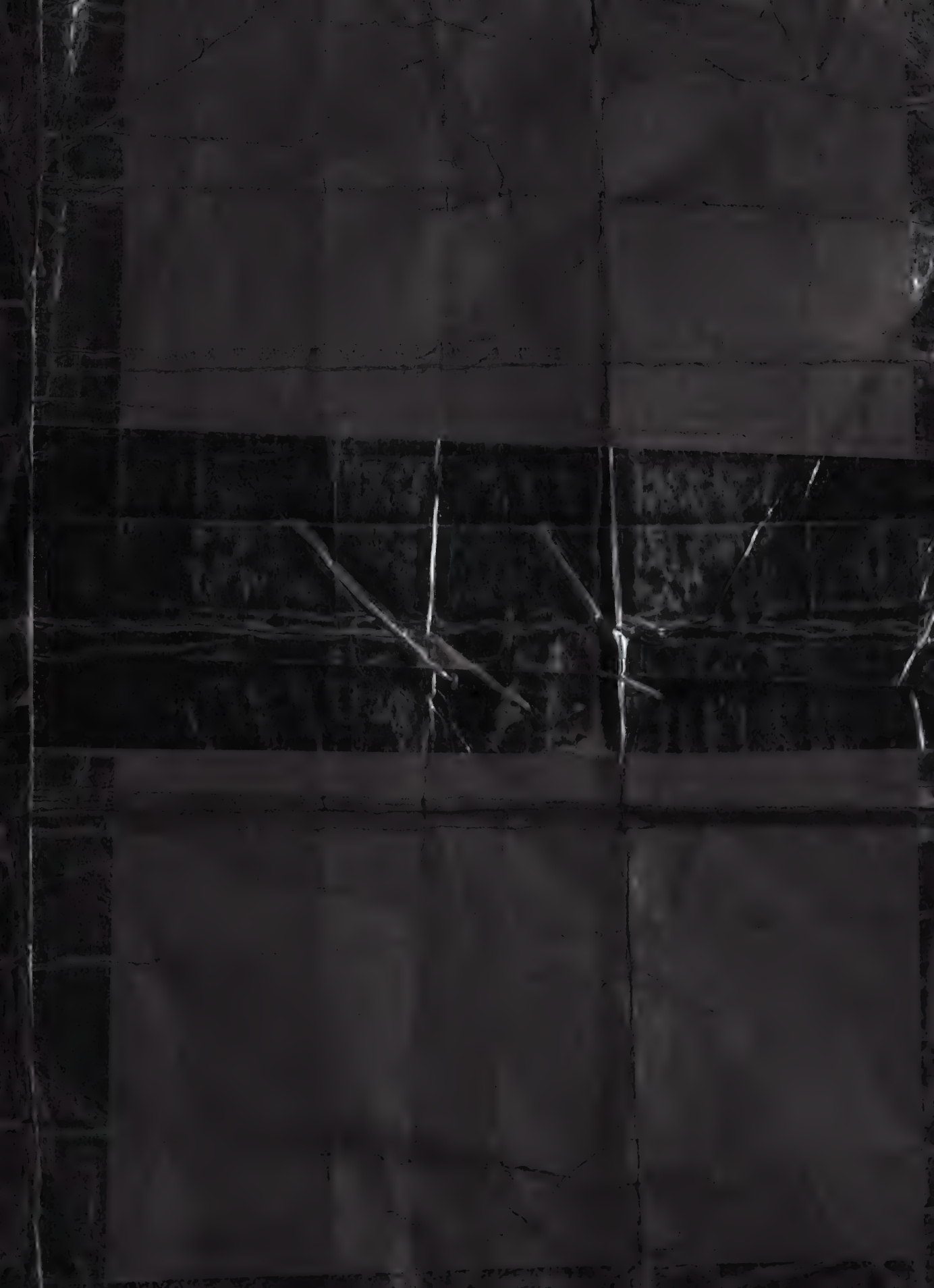
UREMENT
dios equipped with "Digital Private-Line"
tion measuring equipment must extend to
esponse characteristic is not available, the
nitter send continuous sine wave during the
e an accurate deviation measurement. To
gether the base and emitter plating of PTT
d. A continuous sine wave will now be sent
e keyed by pressing the microphone PTT
djustment is complete, replace the jumper

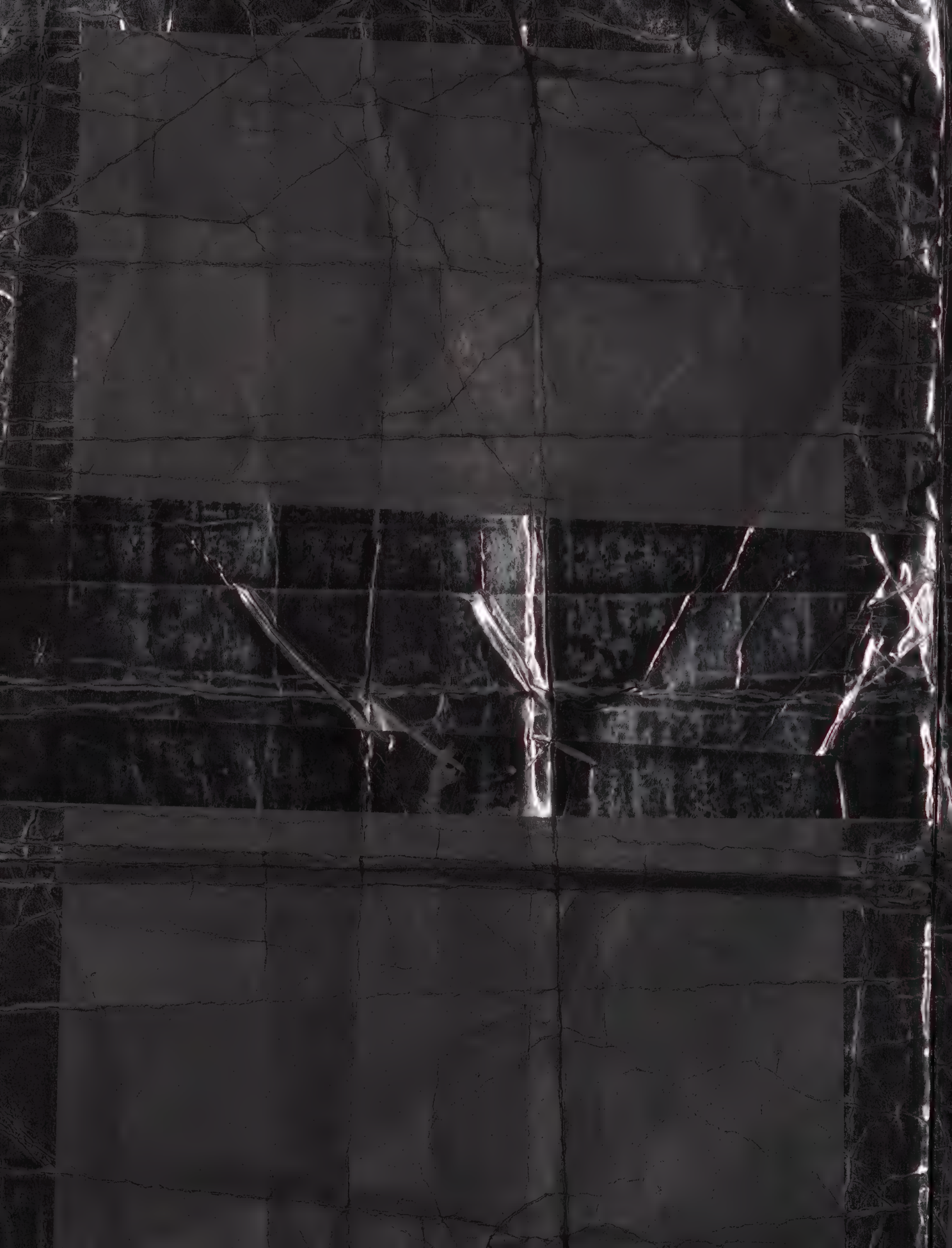
RECEIVER ALIGNMENT P



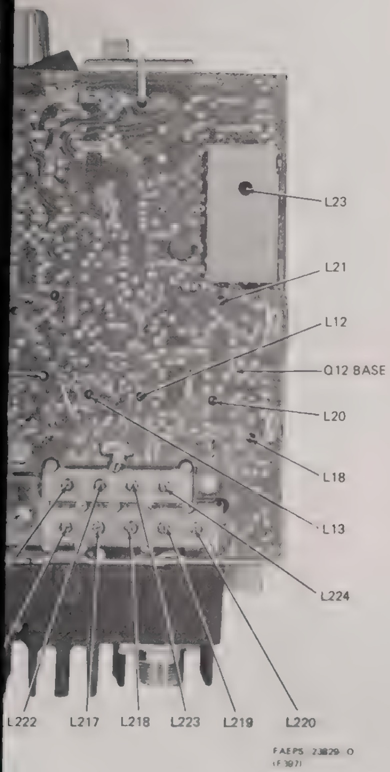
RECEIVER METER READ

METERING POINT	VOLTMETER LE CONNECTION +	-
TP1 2nd If Ampl. Signal Level	TP1	Cha Gro
TP2 Quadrature Detector Output	TP2	Cha Gro
TP3 Injection Osc. Output	TP3	Cha Gro





PROCEDURE



NGS WITH 20,000 OHM/VOLT VOLTMETER

AD S	VOLTMETER SCALE	TYPICAL READINGS
sis und	2.5 V DC	[illegible]
sis und	10 V DC	[illegible]
sis und	50 uA DC	[illegible]

PREALIGNMENT NOTES

1. When changing receive frequency by any amount, it is
the specified pre-set positions for all coils. Tuning from
filter, resulting in degradation of spurious response rejec

2. On "Digital Private-Line" and "Private-Line" radio se
the microphone hang-up button.

3. In some cases, peak meter readings may occur at two po
peak where the slug is nearest the top of the coil form (av

4. Unnecessary tuning adjustments should be avoided. U
alignment. Complete receiver alignment is necessary in t

   a. After changing the receiver operating frequency.
   b. After replacing a component in a frequency-sensitiv

5. Before beginning a complete receiver alignment, preset t

   a. Set L221, 222, 223, 224 9 turns CCW from fully in
   b. Set L216, 217, 218, 219, 220 11 turns CCW from fu
   c. Set L12, 13, 15, 18, 20, 21, 23 flush with main circui

6. Receiver frequency calculations:

$$f_{osc} = \frac{f_c - 10.7\ MHz}{9} \text{ and } f_{inj} = 9f_{osc} = f_c - 10.7\ MHz$$

7. Two-frequency radios should be tuned on the lower oper

SET-UP

1. Meter with a 20,000 ohm-per-volt voltmeter. Refer to the

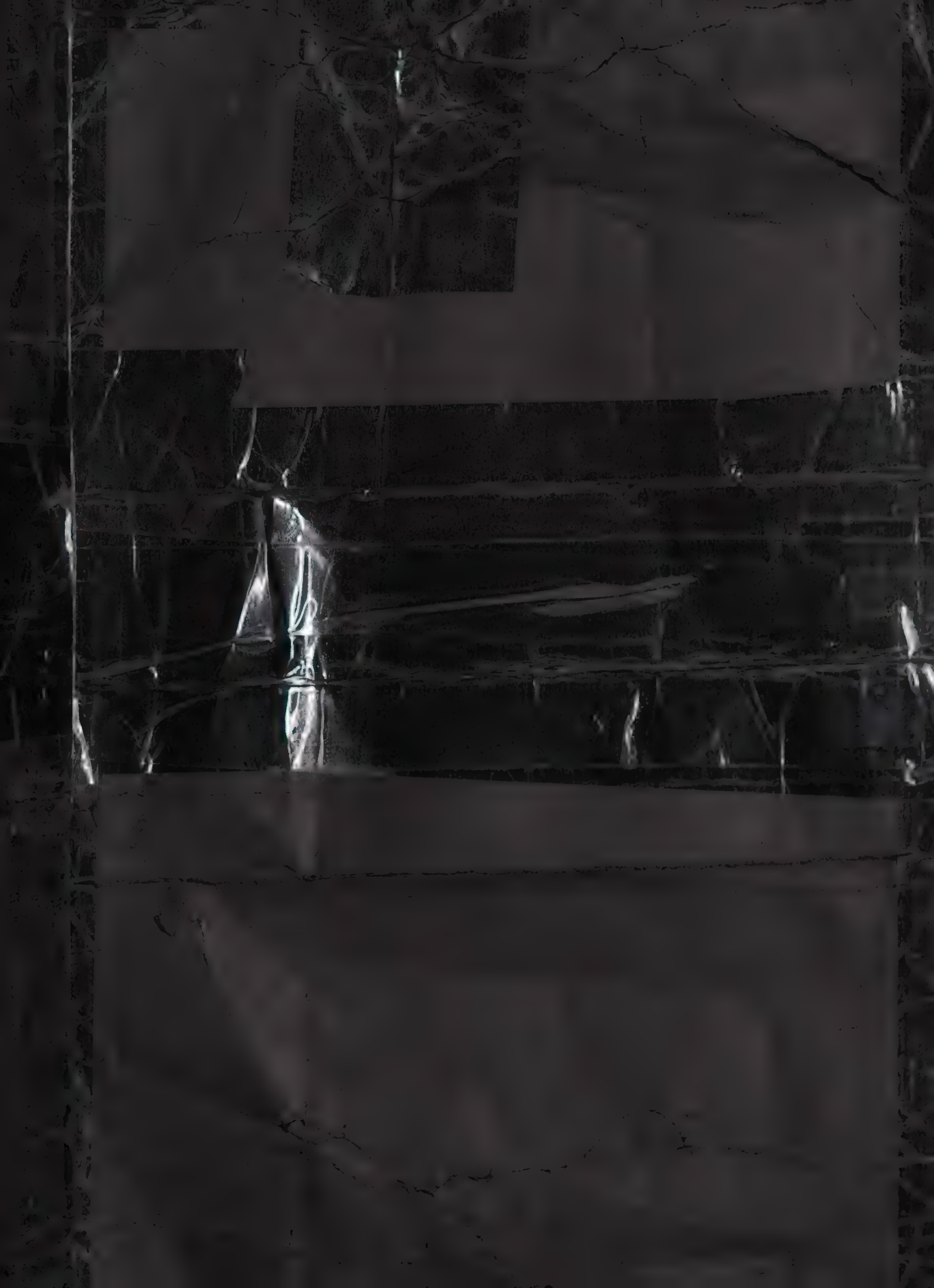
2. Connect a dc power supply to accessory/power connecto

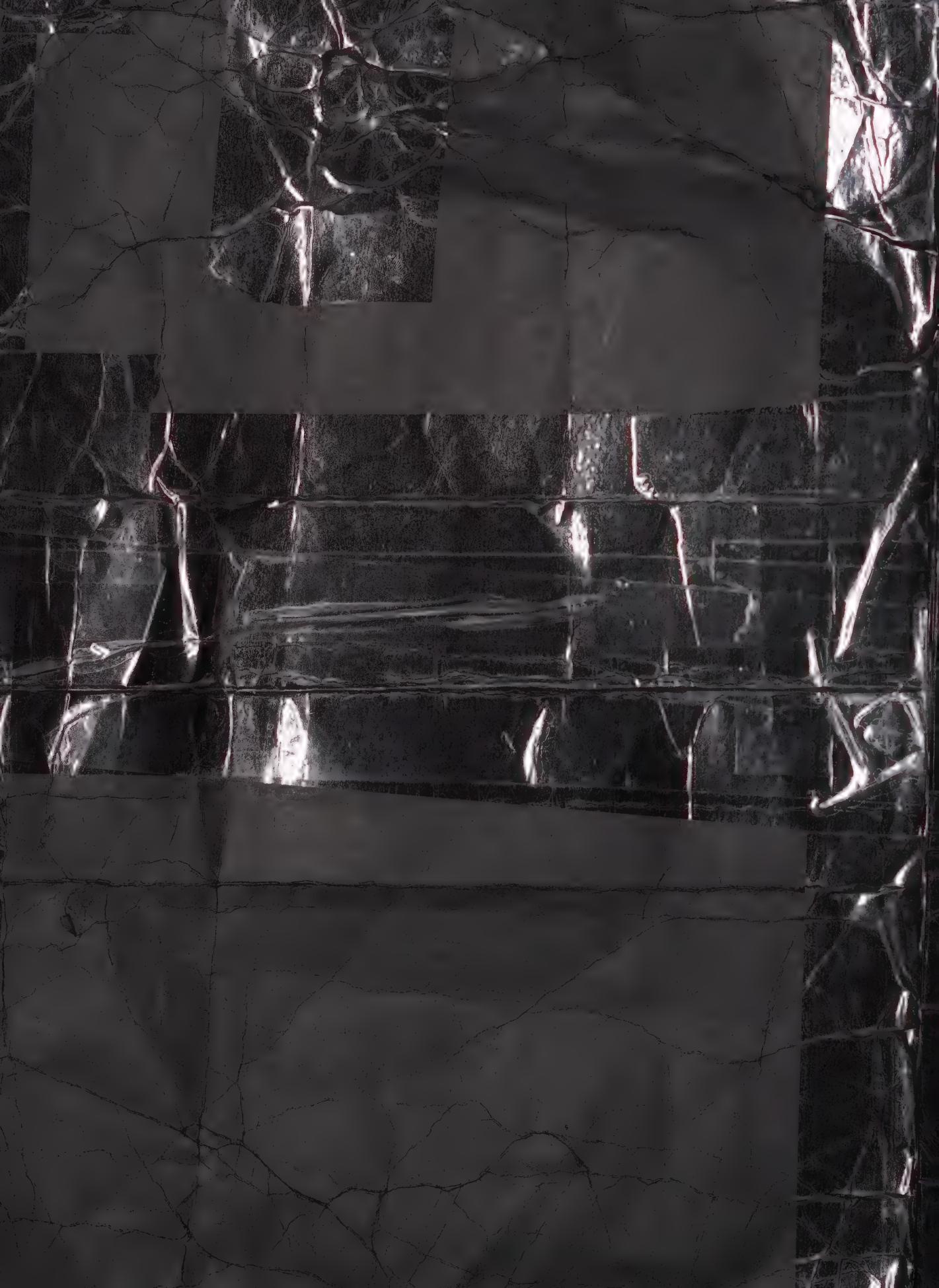
RECEIVER ALIGNMENT

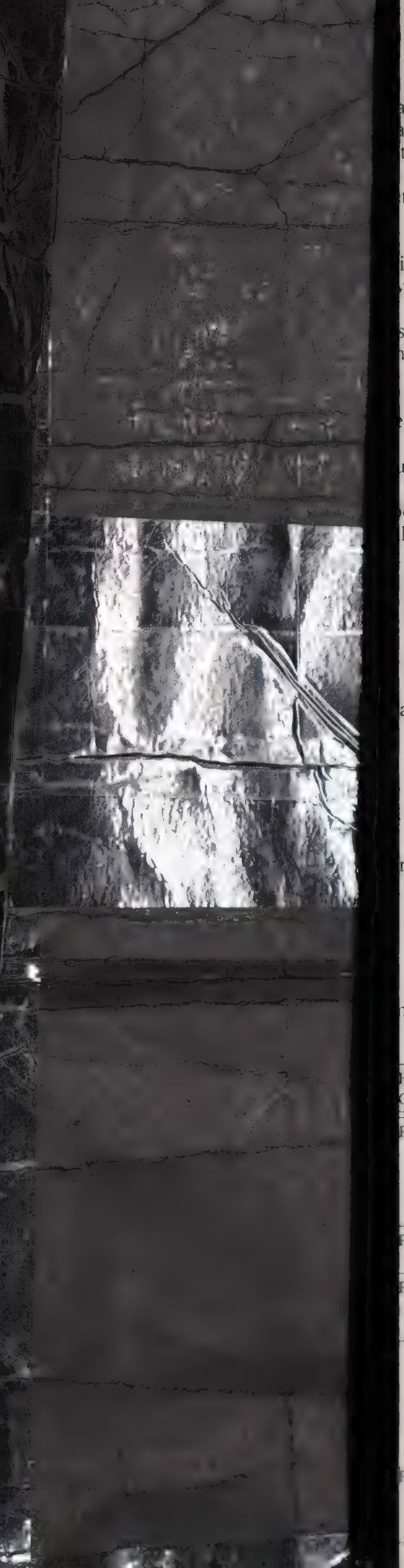
NOTE

Transmitter alignment must be preform

STEP	INPUT SIGNAL	SIGNAL INPUT POINT	T P
1 Quadrature Detector	10.7 MHz@ 1 mV	Near Q12; allow signal to "spray" into circuit (Note 1)	T
2 Injection Oscillator			T
			T
			T







absolutley necessary that realignment proceed from
any other positions will cause misalignment of the rf
tion.

ts, disable the DPL or PL decoder by ungrounding

ints in the tuning range of a coil. Always choose the
ay from the circuit board).

sually, the receiver will require only a "touch-up"
ne following cases:

network.

uning adjustments as follows (See Note 1):

osition.
ly in position.
board.

ating frequency.

metering table on this page.

r J901. Set the power supply output to 13.8 volts.

ned before receiver alignment.

EST OINT	ADJUSTMENT	DESIRED READING
P2	L23	5.8 V DC
P3	Freq Select Switch in "F1", adjust L13	Peak
P3	Freq Select Switch in "F2", adjust L12 (2-freq only)	Peak
	Freq Select Switch to lower freq position, then:	
	L15	Peak
	L221	Peak
P3	L222	Dip
	L223	Peak
	L224	Dip

RECEIVE

STEP
3 Preselecto
4 Fine Freq Adj
5 IF Tuning
6 Final Touc Up

NOTES:

1. With a wire in amplifi
2. To set signal reading

20 DB QU

1. Connec
2. On PI
3. Turn th
4. Turn o
5. Connec frequer
6. Slowly
7. Note th

R ALIGNMENT (CONT'D)

	INPUT SIGNAL	SIGNAL INPUT POINT	TEST POINT	ADJUSTMENT	DESIRED READING
r	Receive freq @ 10 mV (Note 2)	Antenna Connector	TP1	1. Set Freq. Select Switch to lowest freq. position, then adjust L220, 219,218,217,216. 2. Repeat peaking of L220-L216.	Peak
	Receive freq (counted)	Antenna Connector	Radio Speaker	L13 for freq #1 L12 for freq #2 (2 freq radios only)	Audio zero beat
	10.7 MHz Osc.	"Spray" into base of Q12 (Note 1)			
	Receive freq (counted)	Antenna Connector	TP1	L18, 20, 21	Peak
:h-	Receive freq (no modulation)	Antenna Connector		L220, 219, 218, 217, 216 (in descending order) then l224 (± ½ turn) L15 (In turn)	Maximum quieting) (Adjusting signal level to maintain approx. 20 dB quieting

wire connected to a 10.7 MHz signal source output, "spray" the signal near Q12 (that is place the close proximity to Q12) but do not allow the wire to make physical contact with any part of the i-f er.

signal generator on frequency without a frequency counter, open receiver squelch and adjust the generator frequency until receiver quiets. Carefully adjust signal generator frequency for 5.8 V ; at TP2 or for a 6.0 volt dc vtvm reading at U10, pin 6.

IETING SENSITIVITY MEASUREMENT

:t an ac vtvm across the speaker.

and DPL model radio sets, disable PL by ungrounding the microphone hang-up button.

ıe SQUELCH control fully counterclockwise.

n the radio set and adjust the VOLUME control until a reading of 2 volts is obtained on the ac vtvm.

:t an rf signal generator to the radio set antenna connector. Set the signal generator to the receive ıcy, and set the generator output level control to minimum.

increase the output level of the rf signal generator until the ac vtvm reads 0.2 volts.

.e signal generator output signal level. This signal level is the 20 dB quieting sensitivity of the receiver.

REFERENCE SYMBOL	PART NO	DESCRIPTION

PARTS LIST

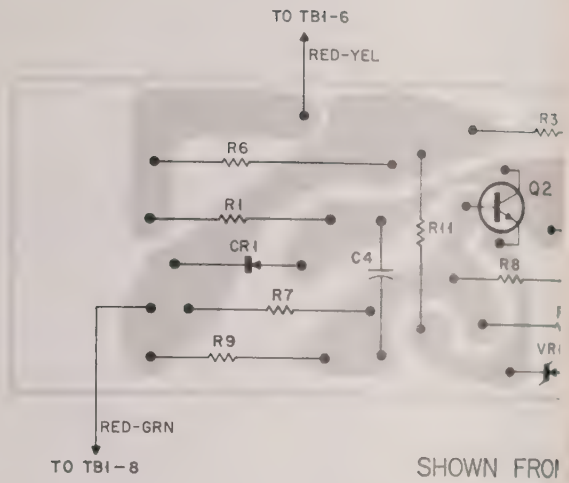
TLN5274A Regulator Board — PL-2257-B

		CAPACITOR, fixed: uF:
C1	8-82905G02	.022 ±10%; 50 V
C2	23-83210A08	100 +150-10%; 25 V
C3, 4	8-82905G02	.022 ±10%; 50 V
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR5	48-82392B03	silicon
		TRANSISTOR: (SEE NOTE)
Q1, 2	48-869170	NPN; type M9170
		RESISTOR, fixed: ±5%; 1/2 W: unless otherwise stated
R1	6-400812	470
R2	6-400459	1.5k
R3	6-400422	33
R4	17-82177B40	200; 5 W
R5, 6	6-5593	470 ±10%; 1 W
R7, 8	6-6411	1k
R9, 10	6-6320	10k ±10% (NOTE: Use is optional; determined at factory)
R11	6-6393	1.2k ±10%
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
VR1	48-83696E01	silicon; Zener type; 6.8 V ±5%

TRN6282A Power Supply Chassis — PL-3349-B

		CAPACITOR, fixed:
C1	23-82464C08	11,000 uF +75-10%; 35 V
		SEMICONDUCTOR DEVICE, diode: (SEE NOTE)
CR1, 2	48-82732C07	silicon
CR3, 4	48-82732C10	silicon
		CONNECTOR, receptacle:
J1		includes: 15-10183A52 INSULATOR, 6-contact 29-82335A01 CONTACT, male; 4 req'd. (P/O Model TLN5219A)
		FUSE, cartridge:
F1	65-804908	slow-blow type; 2 A
		LINE CORD:
P1	30-83212F01	includes: ac plug
		TRANSISTOR: (SEE NOTE)
Q3	48-869677	PNP; type M9677
Q4	48-869244	NPN; type M9244
		SWITCH, slide:
S1	40-84622B02	DPST
		TRANSFORMER, power:
T1	25-83594E02	pri: res 2.75 Ohms sec: res 0.11 Ohm
		TERMINAL STRIP:
TS1	31-121700	8 terminals; No. 2 & 7 mtg.
		FUSEHOLDER:
XF1	75-82083C01	extractor post type
	NON-REFERENCED ITEMS	
	26-84923B03	HEATSINK
	1-80745B88	HOUSING, power supply

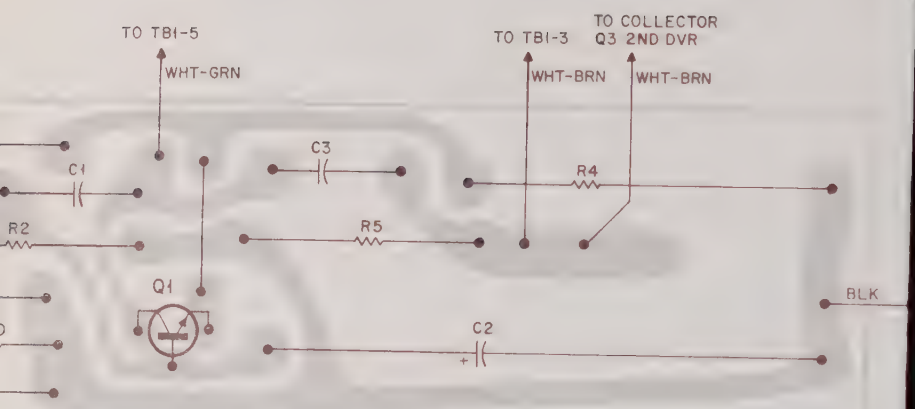
Replacement diodes and transistors must be ordered by listed part number only for optimum performance.



MODEL TABLE

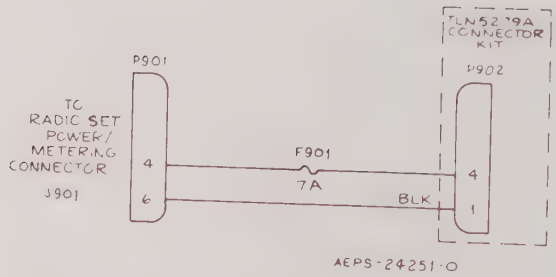
MODEL	SUB-MODEL	VERSION	DESCRIPTION
TPN1136A	TLN5274A	O	REGULATOR BOARD
	TRN6282A	Q	POWER SUPPLY CHASSIS
	TLN5279A	O	CONNECTOR KIT

EPS 17211-B

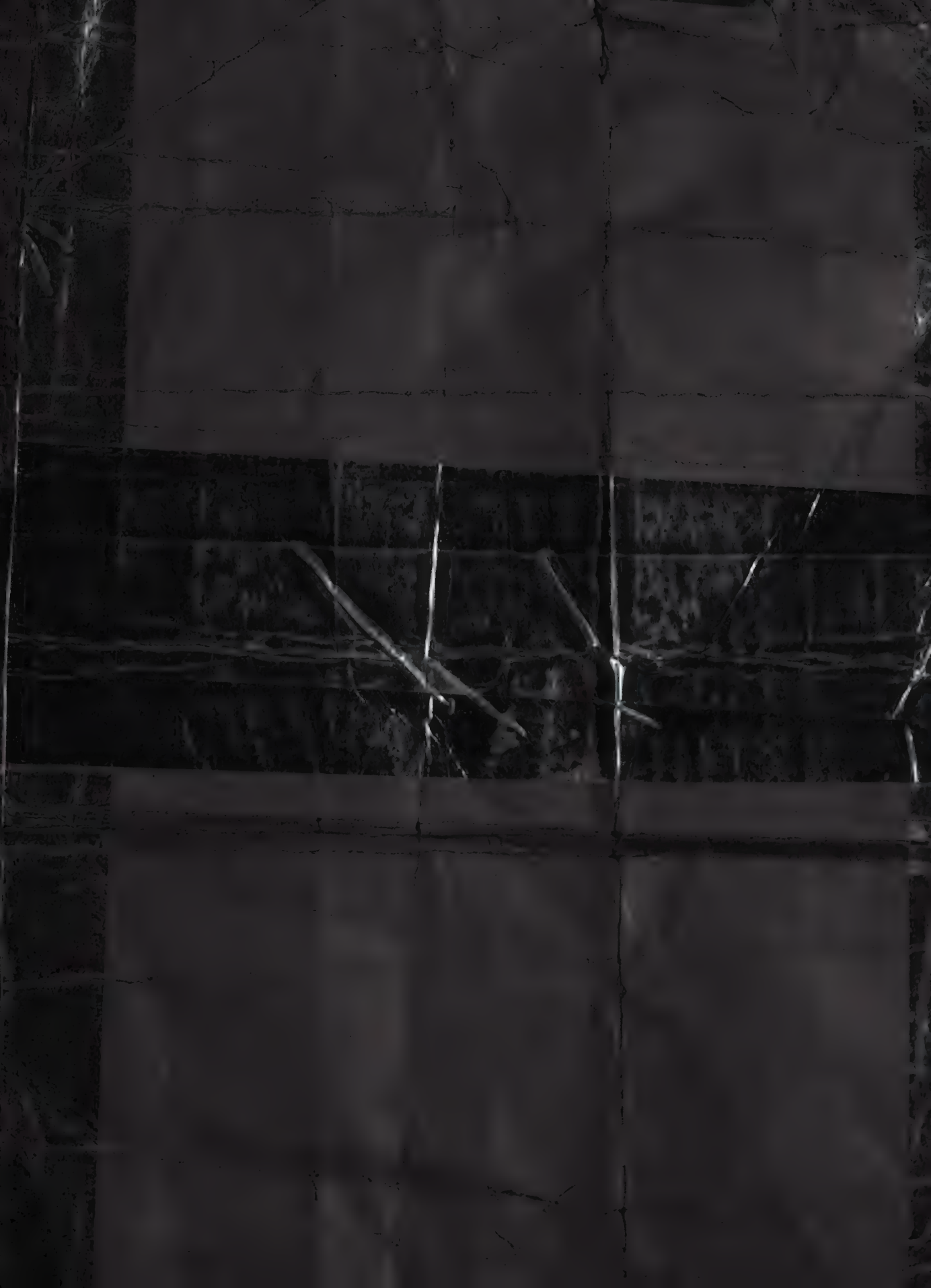


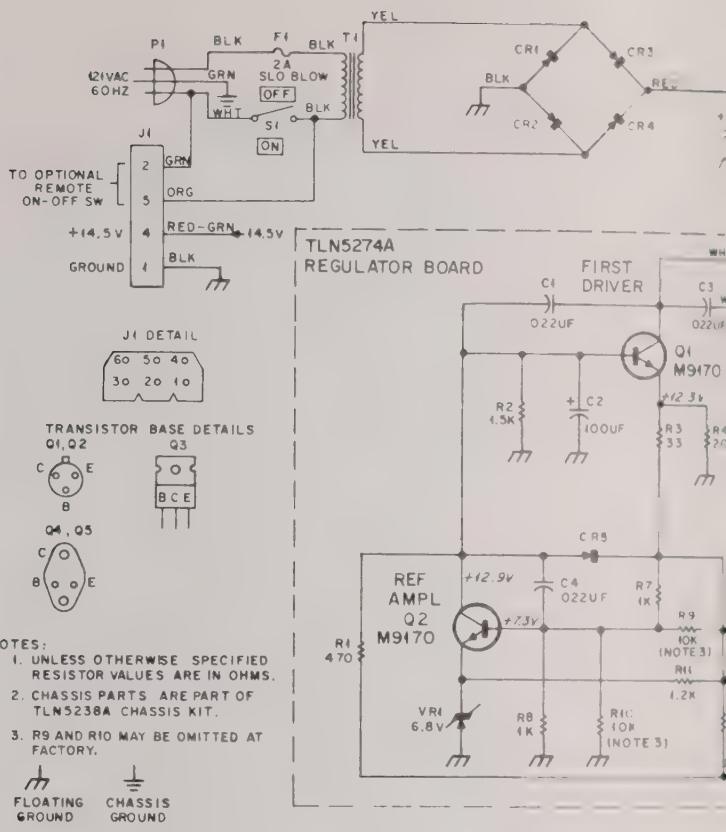
OL-CEPS-11066-A

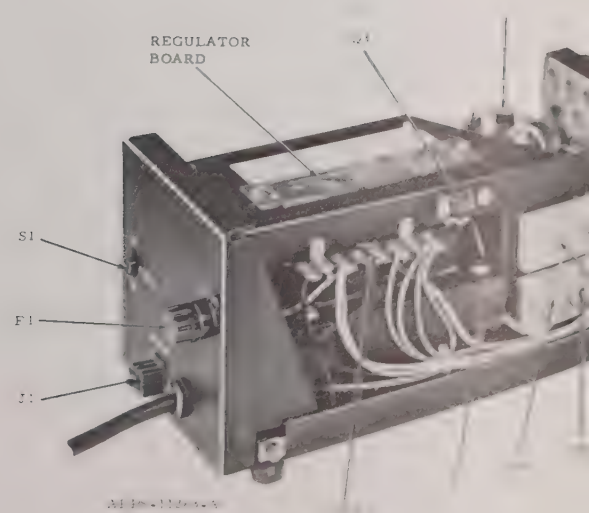
SOLDER SIDE



AEPS-24251-0

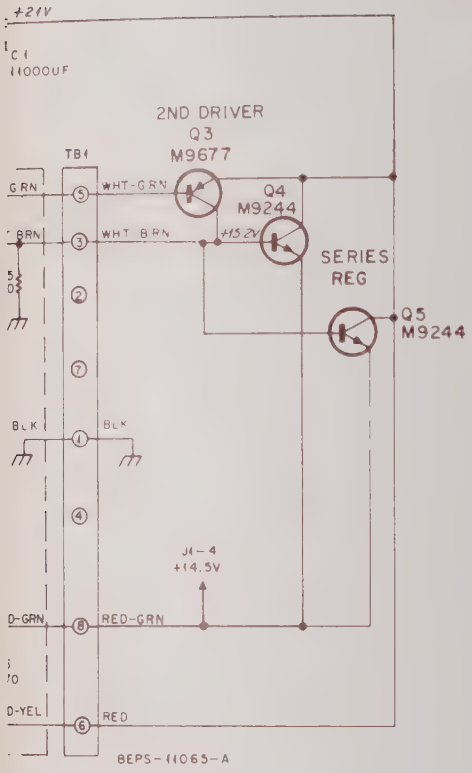



P1
BLK
F1
2A
SLO BLOW
BLK
T1
YEL
CR1
CR3
121VAC
60HZ
GRN
OFF
WHT
S1
ON
BLK
BLK
CR2
CR4
YEL
J1
2
GRN
TO OPTIONAL
REMOTE
ON-OFF SW
5
ORG
+14.5V
4
RED-GRN
14.5V
GROUND
1
BLK
TLN5274A
REGULATOR BOARD
FIRST
DRIVER
C1
.022UF
C3
.022UF
Q1
M9170
+12.3V
R2
1.5K
C2
100UF
R3
33
J1 DETAIL
60 50 40
30 20 10
TRANSISTOR BASE DETAILS
Q1, Q2
Q3
C
E
B
B C E
Q4, Q5
C
B
E
TO TB1-1
CR5
REF
AMPL
Q2
M9170
+12.9V
+7.3V
C4
.022UF
R7
1K
R9
10K
(NOTE 3)
R11
1.2K
R1
470
VR1
6.8V
R8
1K
R10
10K
(NOTE 3)
NOTES:
1. UNLESS OTHERWISE SPECIFIED RESISTOR VALUES ARE IN OHMS.
2. CHASSIS PARTS ARE PART OF TLN5238A CHASSIS KIT.
3. R9 AND R10 MAY BE OMITTED AT FACTORY.
FLOATING GROUND
CHASSIS GROUND


REGULATOR
BOARD
S1
F1
J1

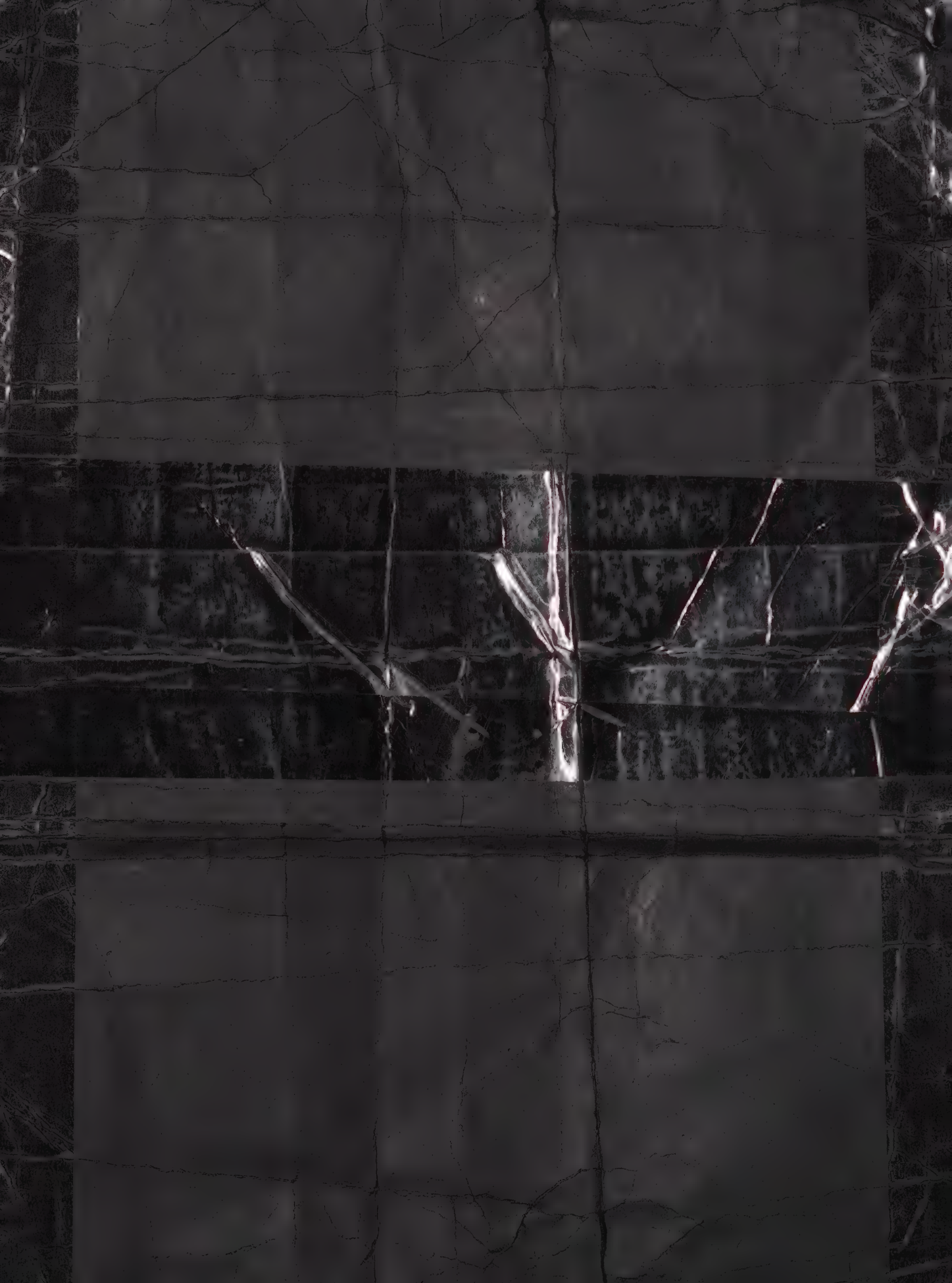
FIXED STATION POWER SUPPLY

MODEL TPN1136A



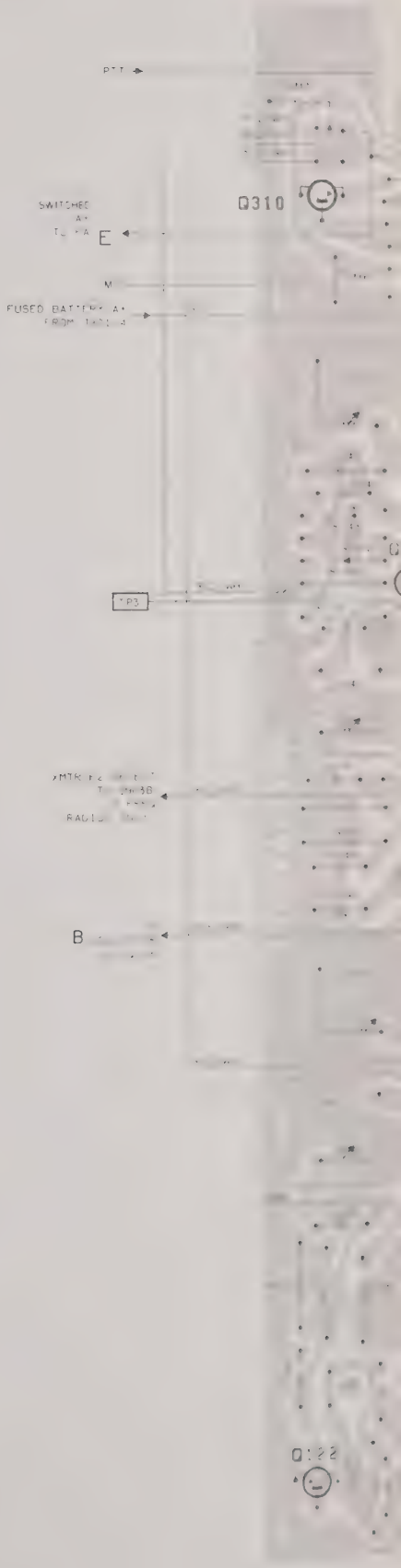
FUNCTION

Provides the entire radio with regulated +14.5 V DC when used in a 120 V AC primary power fixed installation.

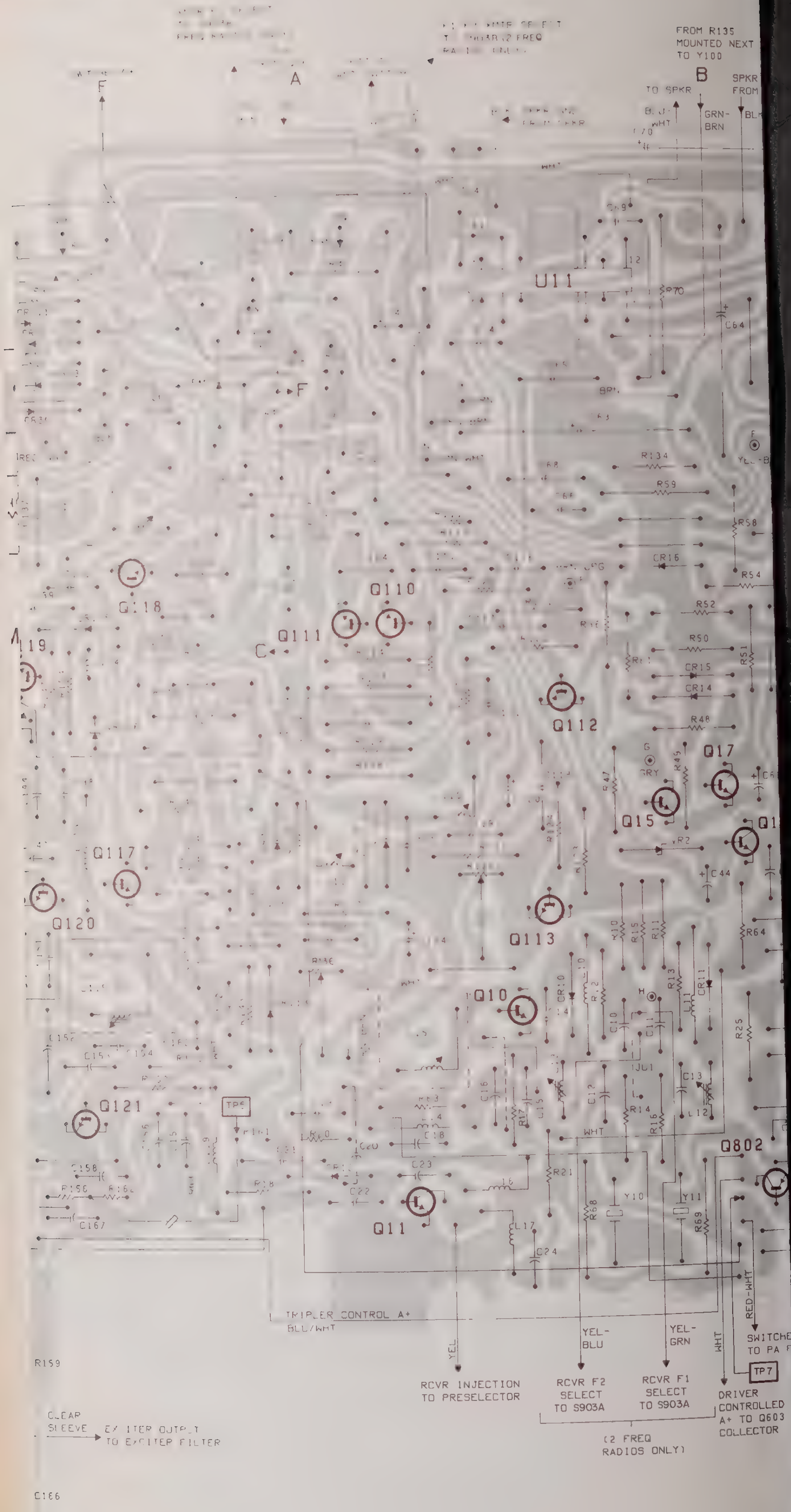


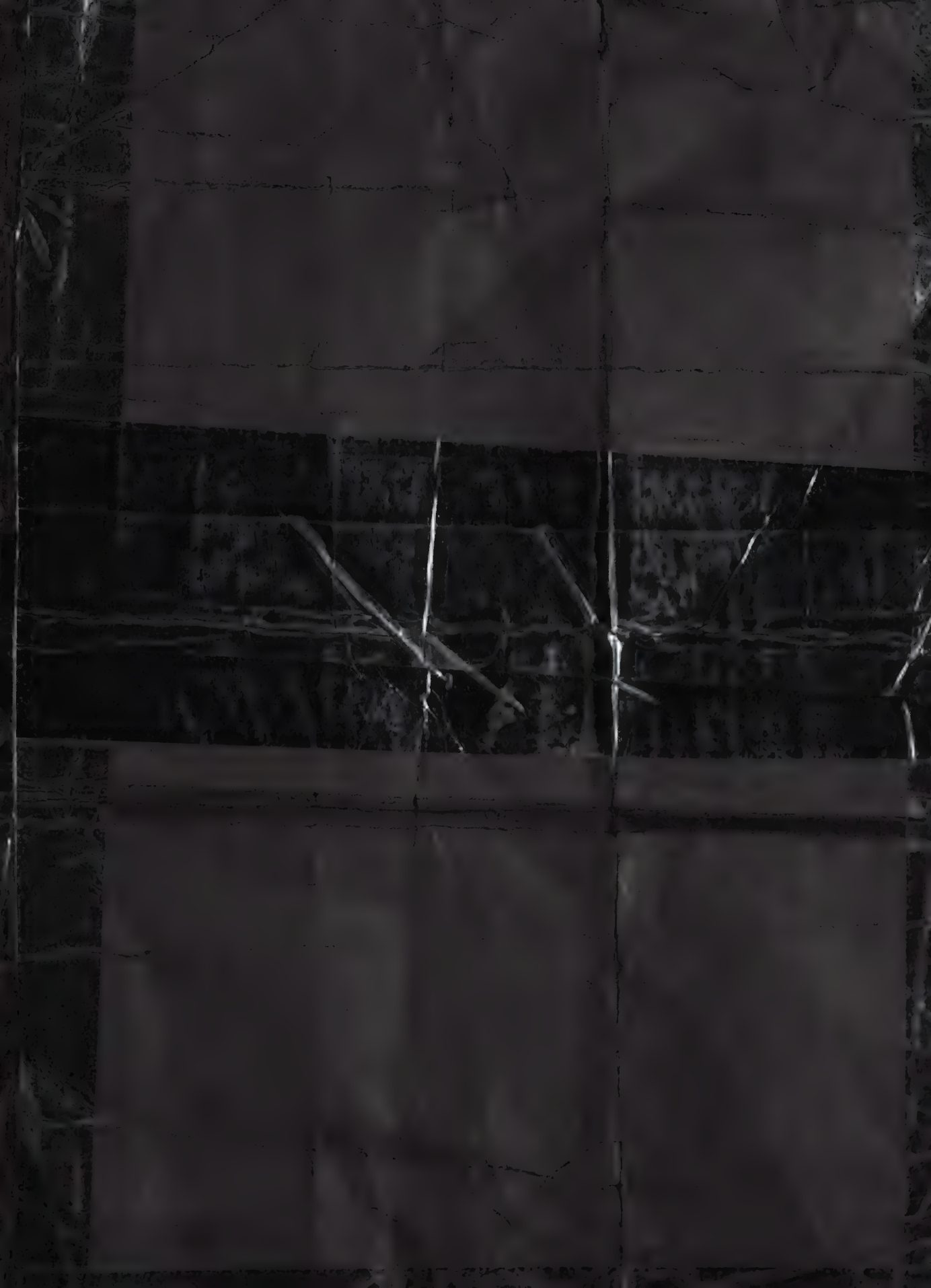
UNIFIED CHASSIS

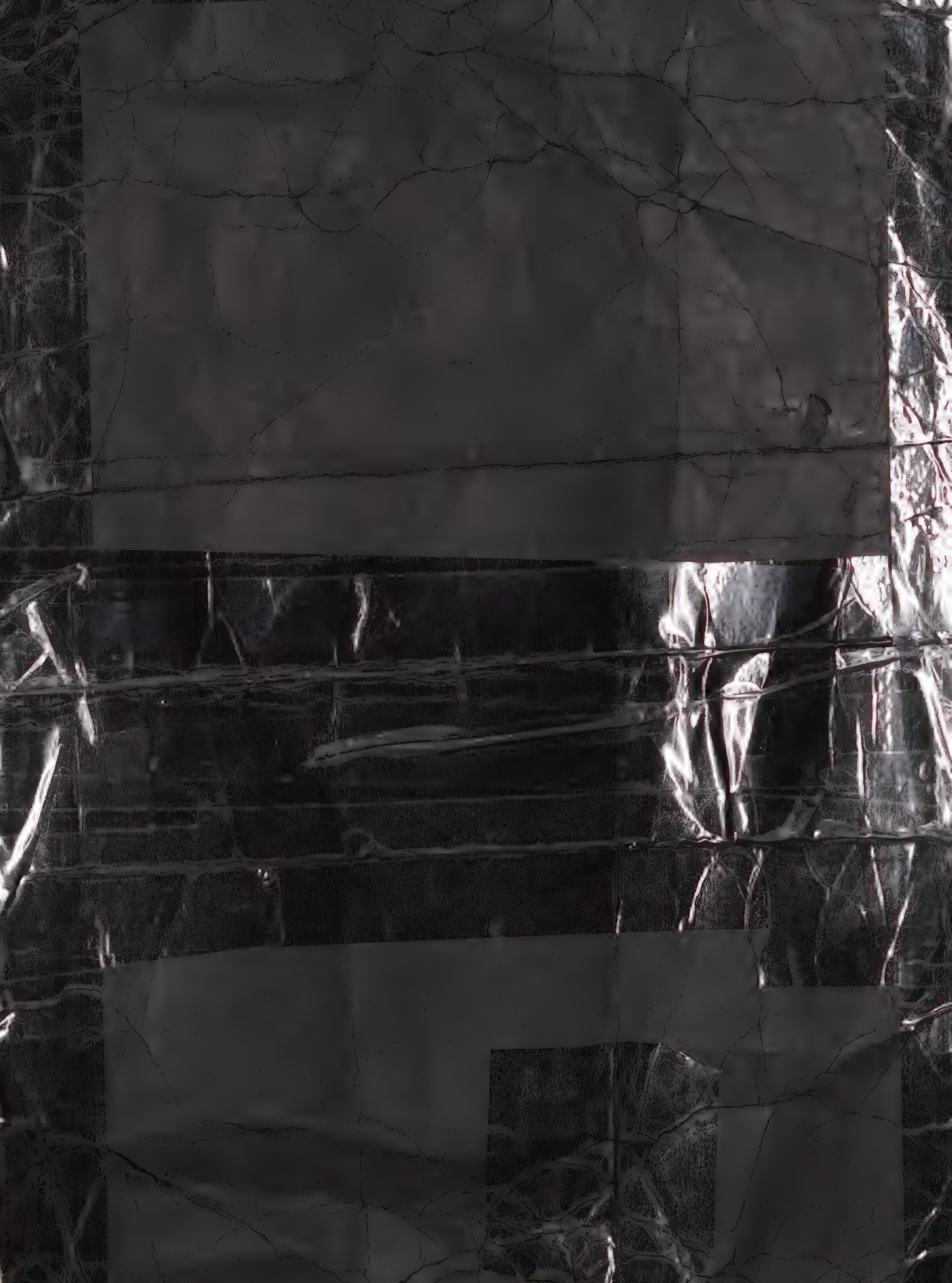
CIRCUIT BOARD DETAIL

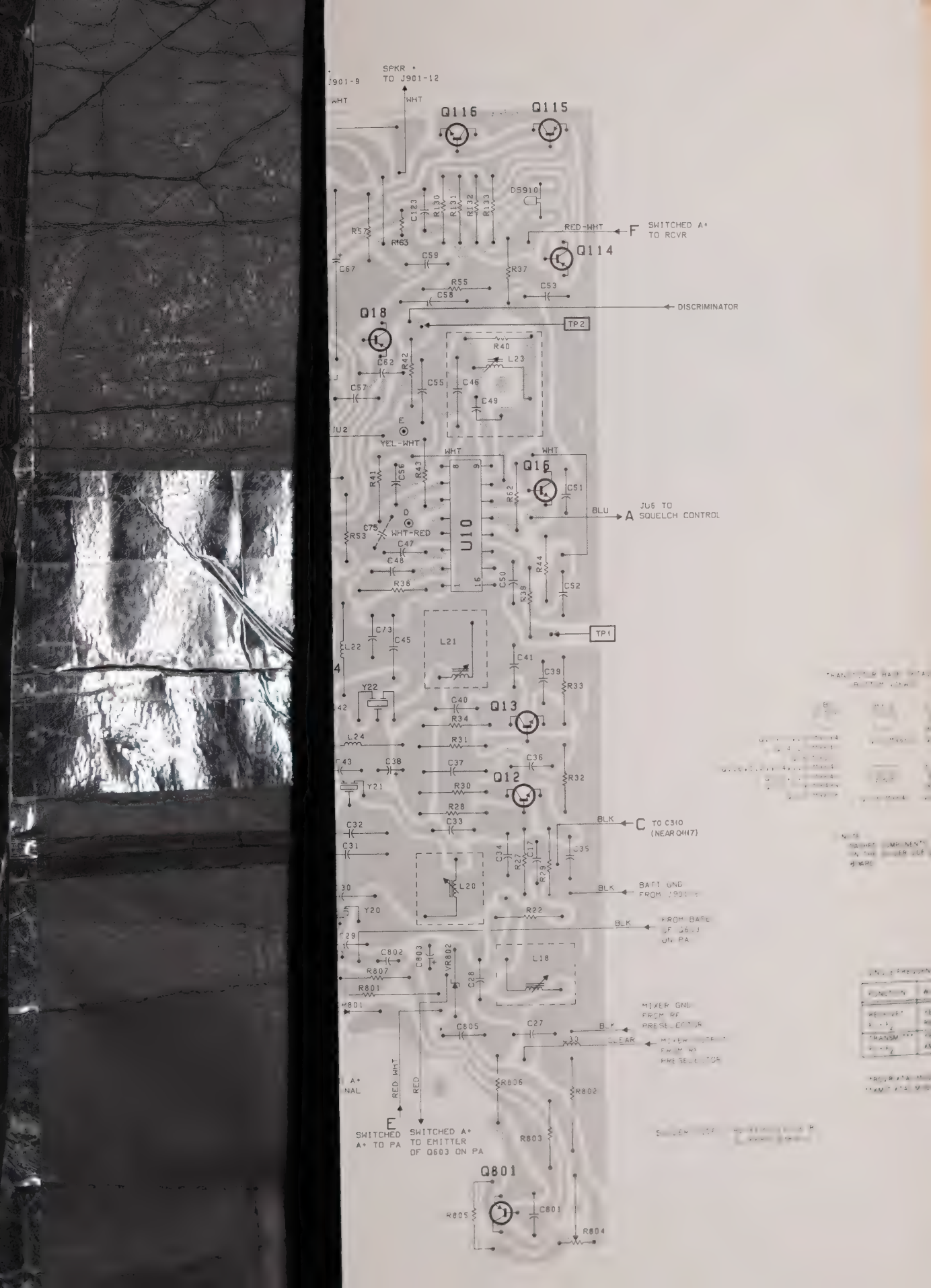


68P81035E27-O
(Sheet 1 of 4)
5/25/77-NPC


FROM R135
MOUNTED NEXT
TO Y100
B
A
F
TO SPKR
SPKR
FROM
GRN-
BRN
U11
R70
C64
BRN
R134
R59
R58
CR16
R54
R52
Q118
Q110
Q111
C
R50
R51
CR15
CR14
Q112
R48
Q17
G
GRY
Q15
Q117
C44
Q120
Q113
R64
R10
R15
R11
Q10
R13
CR11
R25
C13
L12
R17
R14
R16
WHT
Q121
TP6
C20
C23
C22
R21
Q802
R68
Y10
Y11
R69
Q11
L17
C24
C158
C167
TRIPLER CONTROL A+
BLU/WHT
YEL
YEL-
BLU
YEL-
GRN
WHT
RED-WHT
SWITCHE
TO PA
TP7
R159
RCVR INJECTION
TO PRESELECTOR
RCVR F2
SELECT
TO S903A
RCVR F1
SELECT
TO S903A
DRIVER
CONTROLLED
A+ TO Q603
COLLECTOR
(2 FREQ
RADIOS ONLY)
CLEAR
SLEEVE
C166







SPKR +
TO J901-12
J901-9
WHT
Q116
Q115
DS910
C123
R130
R131
R132
R133
R57
R163
RED-WHT
F
SWITCHED A+
TO RCVR
Q114
C59
C67
R37
R55
C58
C53
DISCRIMINATOR
Q18
TP2
R40
L23
C62
R42
C55
C46
C57
C49
E
YEL-WHT
WHT
WHT
Q16
R41
C56
R43
R62
C51
BLU
A
JU6 TO
SQUELCH CONTROL
D
C75
WHT-RED
R53
C47
U10
C48
R44
R38
C50
R39
C52
TP1
C73
C45
L22
L21
C41
C39
R33
Y22
C40
Q13
R34
L24
R31
C43
C38
C37
C36
Y21
R30
Q12
R32
R28
C33
BLK
C
TO C310
(NEAR Q417)
C32
C31
C34
R27
C17
R29
C35
L20
BLK
BATT GND
Y20
R22
BLK
C802
C803
VR802
L18
R807
C28
R801
MIXER GND
FROM RF
PRESELECTOR
C805
C27
BLK
CLEAR
RED WHT
RED
R806
R802
E
SWITCHED
A+ TO PA
SWITCHED A+
TO EMITTER
OF Q603 ON PA
R803
Q801
R805
C801
R804

LS

21-M9657

22-M9887

Q210,211-M9533

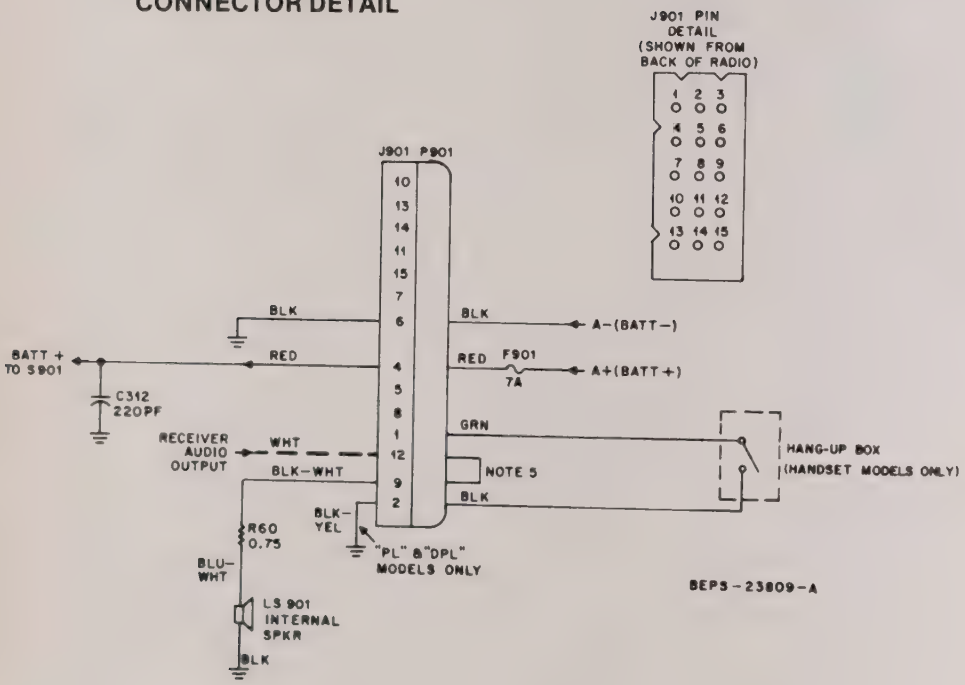
RE LOCATED
F THE CIRCUIT

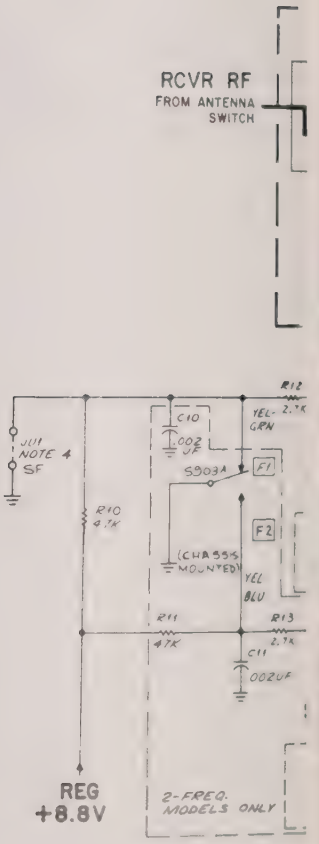
Y STRAPPING TABLE

E COLOR	CONNECTED TO
-BLU R F_2 SEL	HOLE "H" RCVR F_1 PAD
-RD R F_2 SEL	HOLE "Y" XMTR F_1 SEL

BE IN F_1 SOCKET
BE IN F_1 SOCKET

CONNECTOR DETAIL





NOTES:

1. COMPONENTS MARKED WITH AN ASTERI
VALUES (OR TYPE NUMBER) ON DIFFERE
SEE UNIFIED CHASSIS PARTS LIST.
2. UNLESS OTHERWISE NOTED: RESISTOR V
AND CAPACITOR VALUES ARE IN PICOFA
3. UNLESS OTHERWISE NOTED, DC VOLTAG
WITH A 20,000 OHM PER-VOLTMETER. A
ARE MEASURED WITH AN RF VOLTMETE
VOLTAGES MEAS RED WITH VOLU
COUNTERCLOCKWISE (MINIMUM VOLUM
S = RCVR SQUELCHED
U = RCVR UNSQUELCHED
4. JUMPER CONNECTIONS ARE SHOWN IN TI

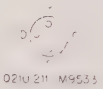
NUMBER	
	SINGLE-FREQUENCY RECEIVER
JU2	CARRIER SQUELCH AN PRIVATE LINE MODE
	SINGLE-FREQUENCY TRANSMITT M

5. THE RADIO IS SUPPLIED WITH A JUMPER
AND 12 OF ACCESSORY PLUG P901. IF AN
IS TO BE USED, REMOVE THIS JUMPER AN
EXTERNAL SPEAKER TO PINS 9 AND 12 O

LS

121 M9657

22 M9887



0210 211 M9533

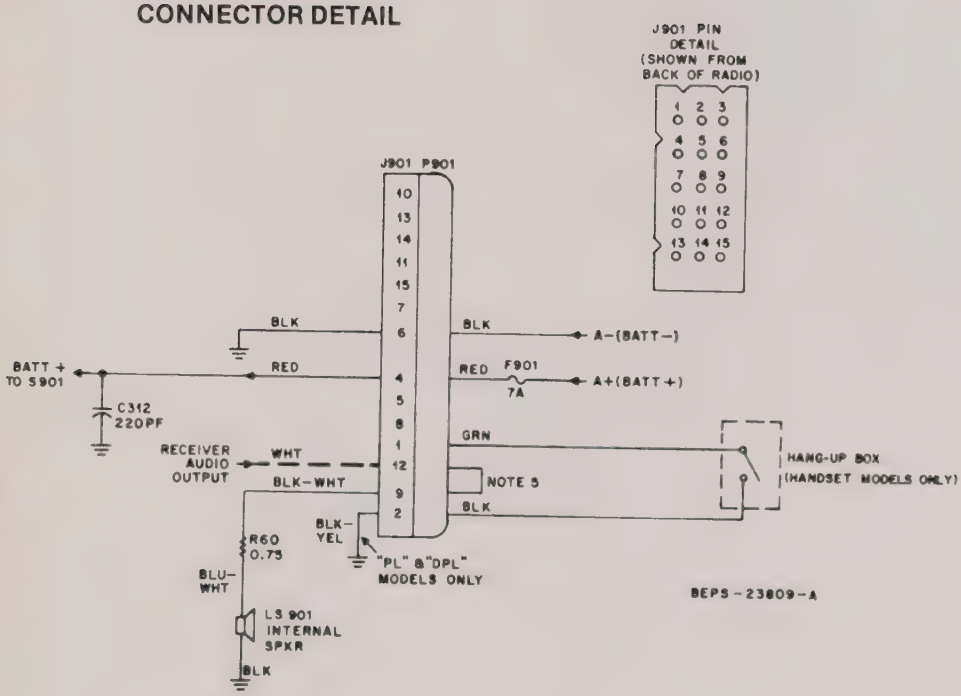
ARE LOCATED
F THE CIRCUIT

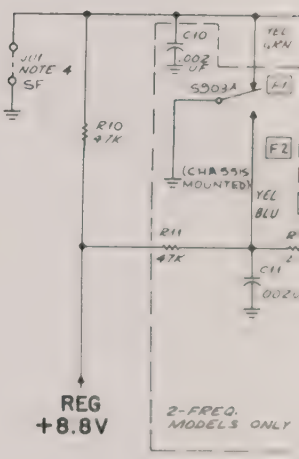
Y STRAPPING TABLE

IE COLOR	CONNECTED TO
-BLU VR F_2 SEL	HOLE "H" RCVR F_1 PAD
-RD TR F_2 SEL	HOLE "Y" XMTR F_1 SEL

BE IN F_1 SOCKET
BE IN F_1 SOCKET

CONNECTOR DETAIL





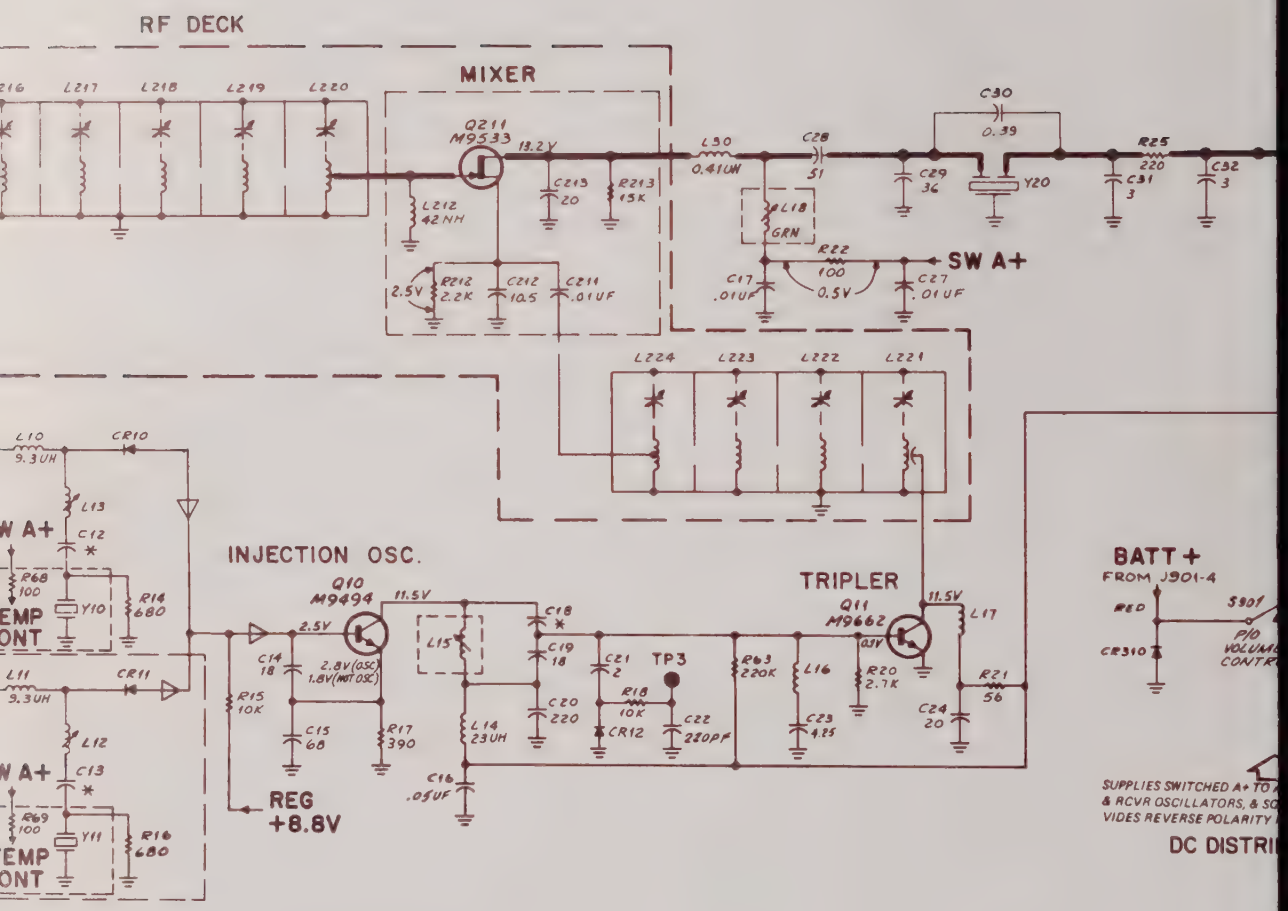
NOTES

1. COMPONENTS MARKED WITH AN AS... VALUES (OR TYPE NUMBER) ON DIF... SEE UNIFIED CHASSIS PARTS LIST.
2. UNLESS OTHERWISE NOTED: RESIST... AND CAPACITOR VALUES ARE IN P...
3. UNLESS OTHERWISE NOTED: DC VO... WITH A 20,000 OHM PER VOLT ME... ARE MEASURED WITH AN RF VOL... U11 VOLTAGES MEASURED WITH VO... COUNTERCLOCKWISE (MIN-MUM VO...
   S = RCVR SQUELCHED
   U = RCVR UNSQUELCHED
4. JUMPER CONNECTIONS ARE SHOWN...

...MPER NUMBER	
...01	SINGLE FREQUENCY RECE...
...02	CARRIER SQUELCH AND DU... "PRIVATE LINE" MODELS
...03	SINGLE FREQUENCY TRANS... MODELS
...06	ALL MODELS

5. THE RADIO IS SUPPLIED WITH A JUM... AND 12 OF ACCESSORY PLUG P60... IS TO BE USED, REMOVE THIS JUMPE... EXTERNAL SPEAKER TO PINS 9 AND...

4-POLE 10.7 MHZ
CRYSTAL FILTER



HAVE DIFFERENT
T RADIO MODELS.

LUES ARE IN OHMS
ADS.
ARE MEASURED
D RF VOLTAGES

CONTROL FULLY

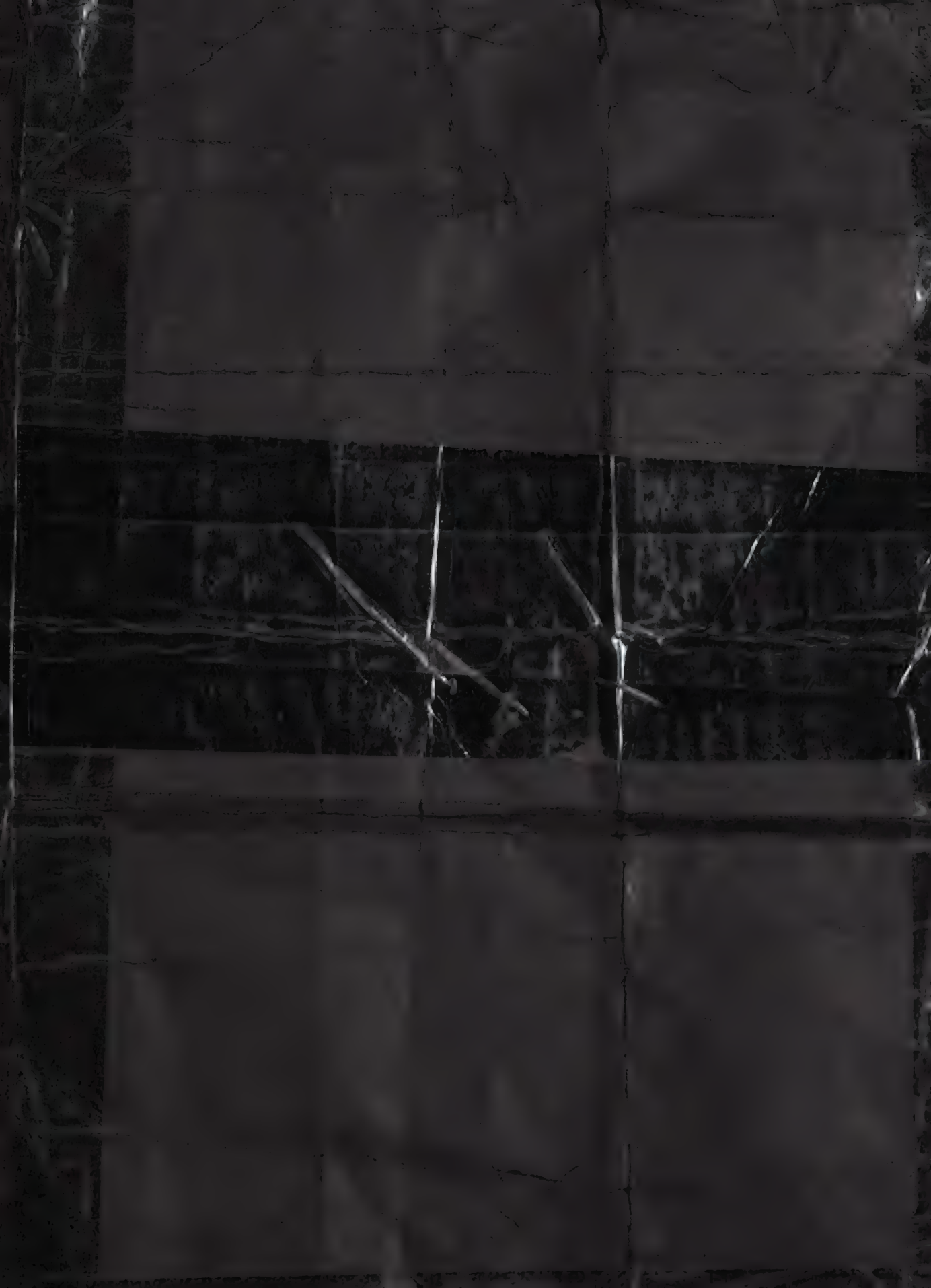
FOLLOWING TABLE.

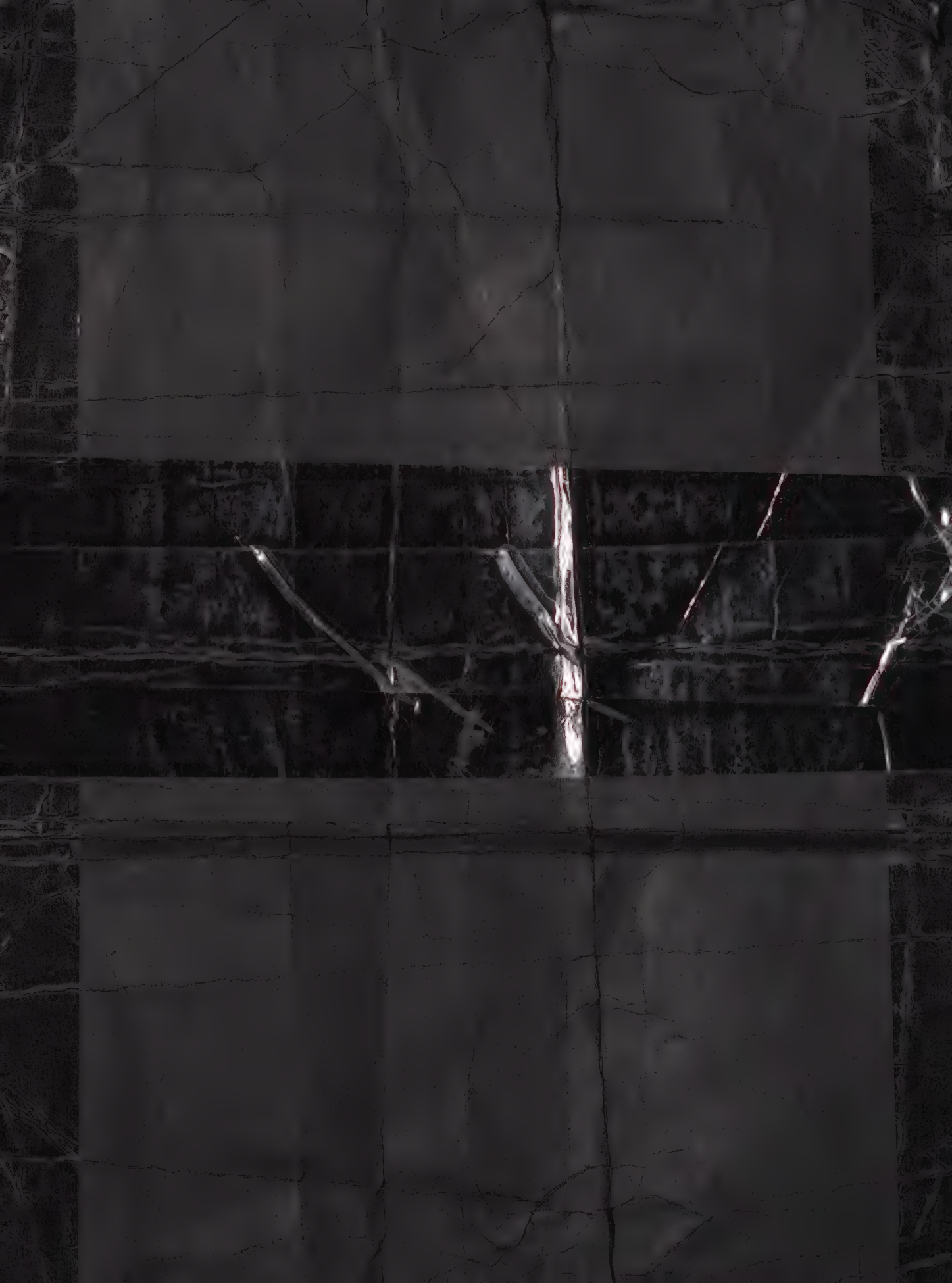
	OUT
DELS	TWO–FREQUENCY RECEIVER MODELS
	TONE CODED "PRIVATE–LINE" SQUELCH MODELS
	TWO–FREQUENCY TRANSMITTER MODELS
	OPTIONAL (DISABLES PWR ON LAMP)

TWEEN PINS 9
XTERNAL SPEAKER
CONNECT THE
P901.

MODEL COMPLEMENT

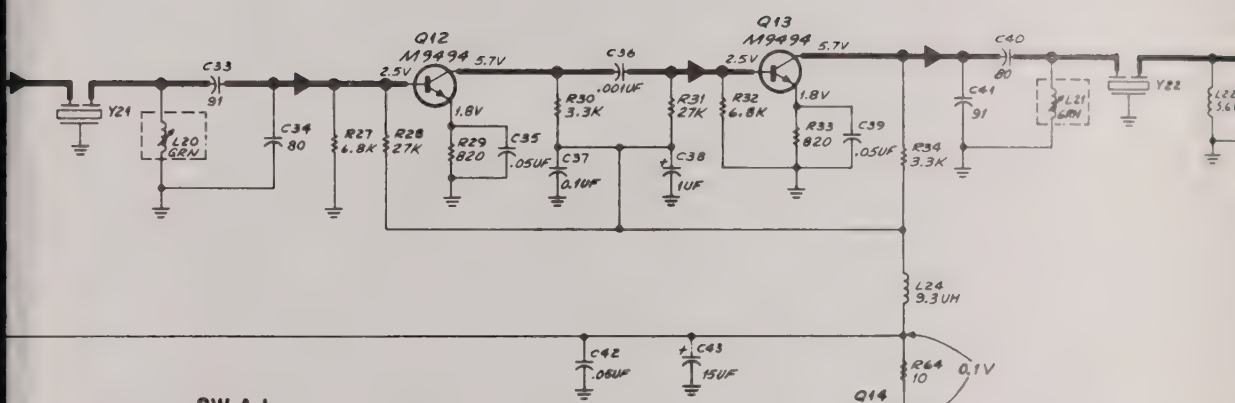
DESCRIPTION	450–470 MHz	VERSION
MAIN BOARD, ONE FREQ.	TLE4073A	0
MAIN BOARD, TWO FREQ.	TLE4083A	0





2-POLE 10.7 MHZ
CRYSTAL FILTER

10.7 MHZ IF AMPLIFIER



MUTE SWITCH

RECEIVE PTT UNGROUNDED. Q14 CONDUCTI
A+ APPLIED TO RF, IF, & OSCILLATOR CIRCUIT
TRANSMIT PTT GROUNDED. Q14 TURNED OF
NO A+ TO RF, IF, & OSCILLATOR CIRCUITS
RCVR MUTED

...LL CIRCUITS EXCEPT XMTR
...UELCH CIRCUIT. CR310 PRO-
...ROTECTION.

...BUTION

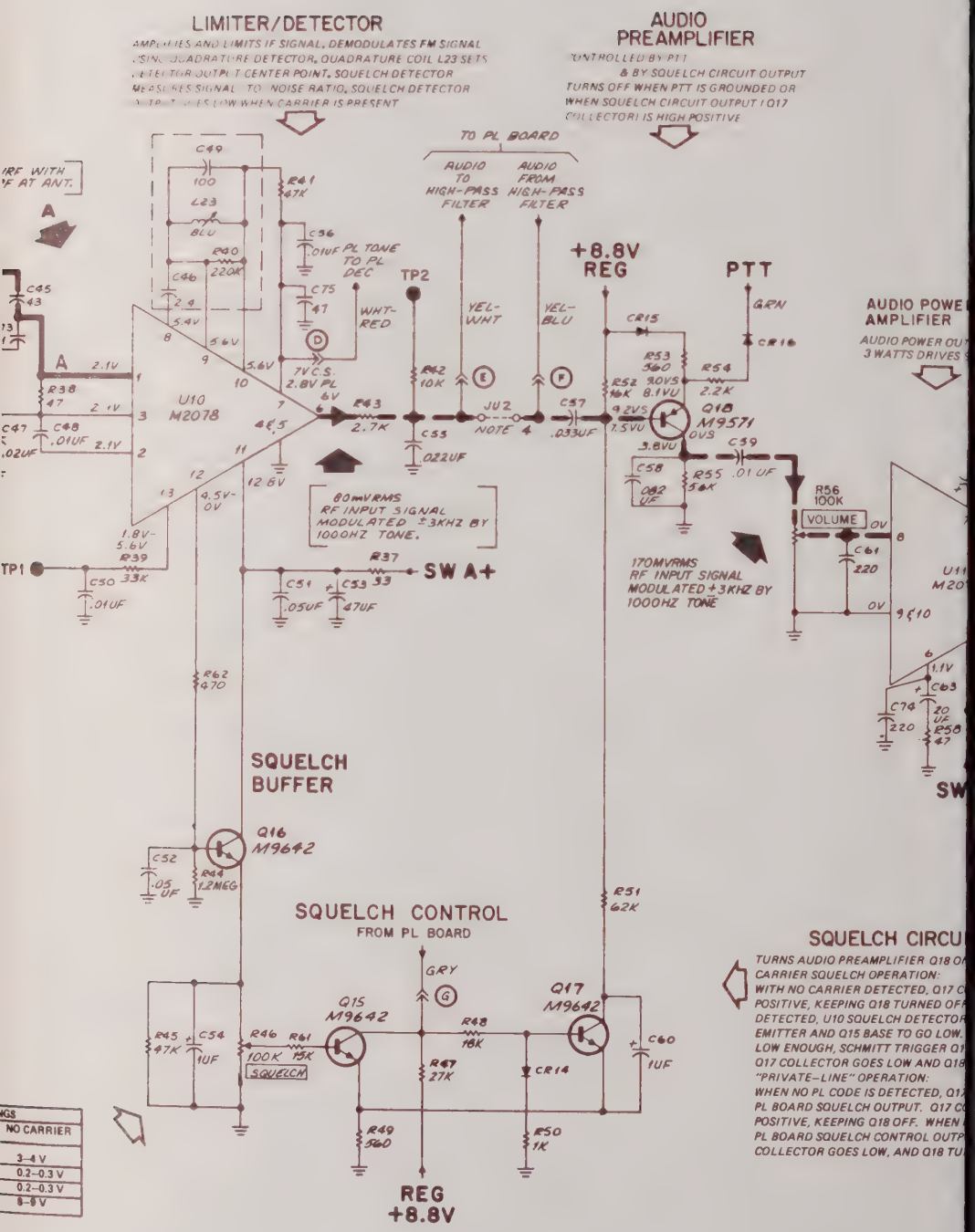
SUPPLIES REGULATED +8.8 V TO XMTR & RCVR OSCILLATORS, SQUELCH CIRCUIT & AUDIO PREAMPLIFIER. Q310 PROVIDES CURRENT REGULATION. VR313 PROVIDES VOLTAGE REGULATION.

VOLTAGE REGULATOR

...TION
... POWER IS APPLIED AT
... RADIO

...QUELCH CIRCUIT VOLTAGE TABL...

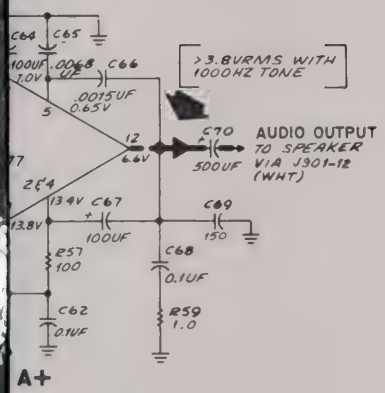
MEASUREMENT POINT	DC VOLTAGE REA... 1000 uV CARRIER AT ANT
Q16 EMITTER	0 V
Q15 ...LECTOR	5 V
Q17 BASE	0.75 V
Q17 COLLECTOR	2...3 V

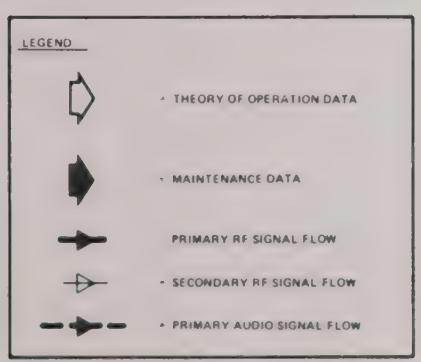

LIMITER/DETECTOR
AMPLIFIES AND LIMITS IF SIGNAL. DEMODULATES FM SIGNAL USING QUADRATURE DETECTOR. QUADRATURE COIL L23 SETS DETECTOR OUTPUT CENTER POINT. SQUELCH DETECTOR MEASURES SIGNAL TO NOISE RATIO. SQUELCH DETECTOR OUTPUT GOES LOW WHEN CARRIER IS PRESENT
AUDIO PREAMPLIFIER
CONTROLLED BY PTT & BY SQUELCH CIRCUIT OUTPUT TURNS OFF WHEN PTT IS GROUNDED OR WHEN SQUELCH CIRCUIT OUTPUT (Q17 COLLECTOR) IS HIGH POSITIVE
TO PL BOARD
AUDIO TO HIGH-PASS FILTER
AUDIO FROM HIGH-PASS FILTER
+8.8V REG
PTT
GRN
CR15
CR16
R53 560
R54 2.2K
R52 16K
Q18 M9571
C59 .01 UF
C58 .082 UF
R55 56K
R56 100K
VOLUME
C61 220
AUDIO POWER AMPLIFIER
AUDIO POWER OUT
3 WATTS DRIVES
U10 M2078
C49 100
L23 BLU
R40 220K
C46 2.4
R41 47K
C56 .01UF
C75 47
PL TONE TO PL DEC
WHT-RED
TP2
YEL-WHT
YEL-BLU
R42 10K
R43 2.7K
C55 .022UF
JU2 NOTE 4
C57 .033UF
7V C.S. 2.8V PL 6V
80mVRMS RF INPUT SIGNAL MODULATED ±3KHZ BY 1000HZ TONE.
170MVRMS RF INPUT SIGNAL MODULATED ±3KHZ BY 1000HZ TONE
TP1
R39 33K
C50 .01UF
R37 33
SW A+
C51 .05UF
C53 47UF
R62 470
SQUELCH BUFFER
Q16 M9642
C52 .05 UF
R44 1.2MEG
R51 62K
SQUELCH CONTROL
FROM PL BOARD
GRY
Q15 M9642
Q17 M9642
R45 47K
C54 1UF
R46 100K
R61 15K
SQUELCH
R48 18K
R47 27K
CR14
C60 1UF
R49 560
R50 1K
REG +8.8V
SQUELCH CIRCU
TURNS AUDIO PREAMPLIFIER Q18 O
CARRIER SQUELCH OPERATION:
WITH NO CARRIER DETECTED, Q17 C
POSITIVE, KEEPING Q18 TURNED OFF
DETECTED, U10 SQUELCH DETECTOR
EMITTER AND Q15 BASE TO GO LOW.
LOW ENOUGH, SCHMITT TRIGGER Q1
Q17 COLLECTOR GOES LOW AND Q18
"PRIVATE-LINE" OPERATION:
WHEN NO PL CODE IS DETECTED, Q17
PL BOARD SQUELCH OUTPUT. Q17 C
POSITIVE, KEEPING Q18 OFF. WHEN
PL BOARD SQUELCH CONTROL OUTP
COLLECTOR GOES LOW, AND Q18 TU
NO CARRIER
3-4 V
0.2-0.3 V
0.2-0.3 V
8-9 V

EEPS-23699-A

FUNCTION

Amplifies, mixes, filters, and demodulates receiver rf energy from antenna (via antenna switch) and provides an amplified audio signal to the speaker.





RADIO SET PARTS LIST

REFERENCE SYMBOL	MOTOROLA PART NO

PARTS LIST

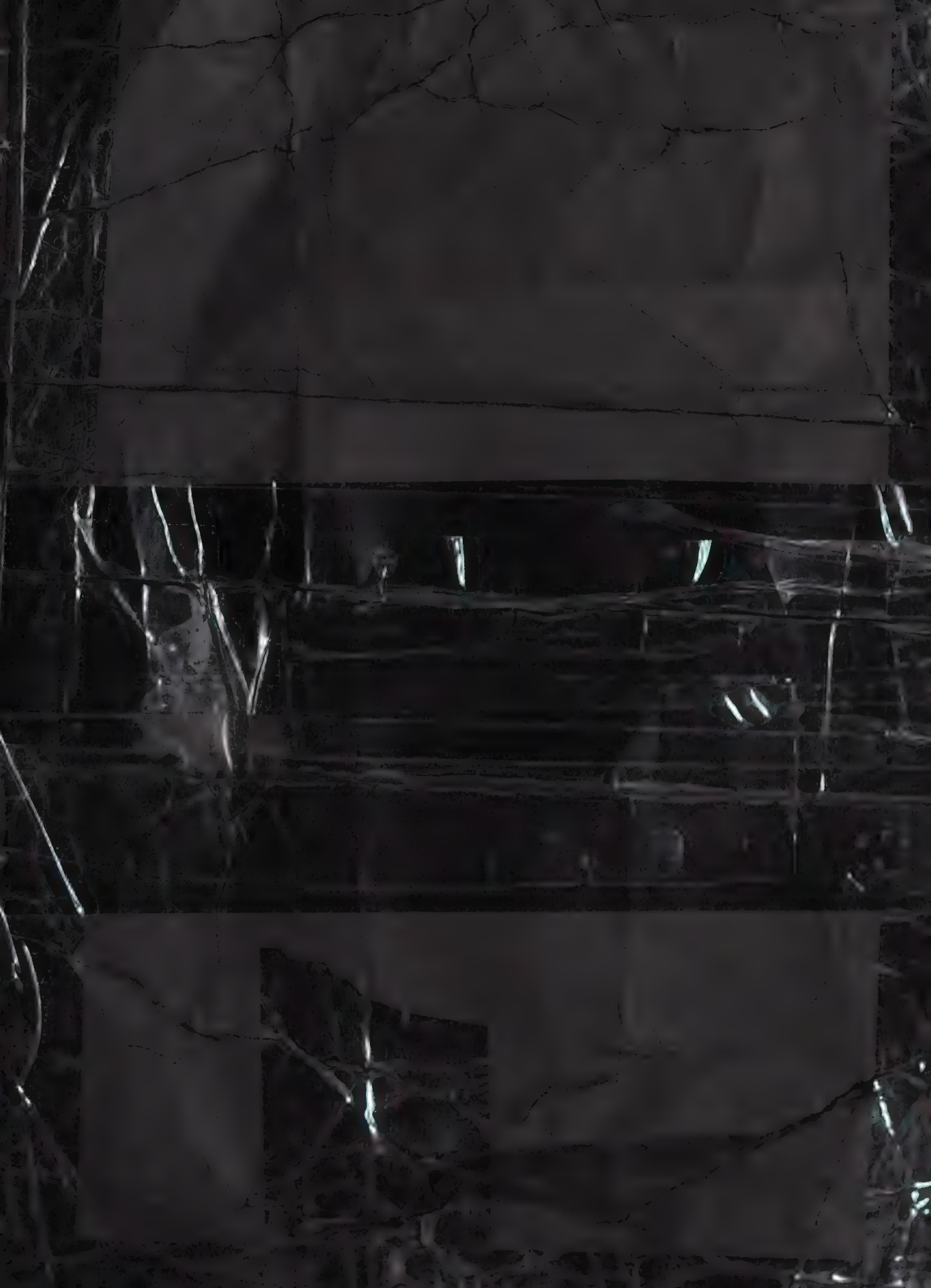
UNIFIED CHASSIS MODELS
[illegible] F1443AB (1-Freq.)
[illegible] F1443AH (2-Freq.)

Receiver components are [illegible]
Exciter components are n[illegible]
RF Deck components are [illegible]
Regulator components are [illegible]
Power Amplifier compon[illegible]
Power Control Driver com[illegible]
Other components are num[illegible]

[illegible] in this parts [illegible]
Power Amplifier.

C10	21-82428[illegible]
C11	21-82428[illegible]
C12	21-82355[illegible]
C13	21-82355B
C14	21-82133[illegible]
C15	21-82610[illegible]
C16	21-82372[illegible]
C17	21-82428[illegible]
C18	21-83406[illegible]
C19	21-12223[illegible]
C20	21-83596E
C21	21-82450[illegible]
C22	21-83596E
C23	21-84493[illegible]
C24	21-85969[illegible]
C25, 26	
C27	21-82428[illegible]
C28	21-82610[illegible]
C29	21-82133[illegible]
C30	21D82450[illegible]
C31, 32	21-82450[illegible]
C33	21-84494[illegible]
C34	21D84494[illegible]
C35	21-82372[illegible]
C36	21-82187[illegible]
C37	21-82372[illegible]
C38	23-84665[illegible]
C39	21-82372[illegible]
C40	21D84494[illegible]
C41	21D84494[illegible]
C42	21-82372[illegible]
C43	23-84538[illegible]
C44	23-84665[illegible]
C45	21-84932[illegible]
C46	21-82450[illegible]
C47	21-82428[illegible]
C48	21-82428[illegible]
C49	21-82358[illegible]
C50	21-82428[illegible]
C51, 52	21-82372[illegible]
C53	23-84538G
C54	23-84665F
C55	8-84496D0
C56	21-82428B
C57	8-82905G0
C58	8-82905G4
C59	21-82428B
C60	23-84665F
C61	21-83596F
C62	21-82372C
C63	23-84669A
C64	23-84669A
C65	8-84496D0
C66	21-82187[illegible]
C67	23-84669A
C68	8-84496D0
C69	21-82877B
C70	23-83210A
C71, 72	
C73	21-82610C
C74	21-83596E
C75	21-82610C
C110, 111	21-83596E
C112, 113	8-82905G0
C114	21-83596E

68P81035E27-O
(Sheet 3 of 4)
5/25/77-NPC

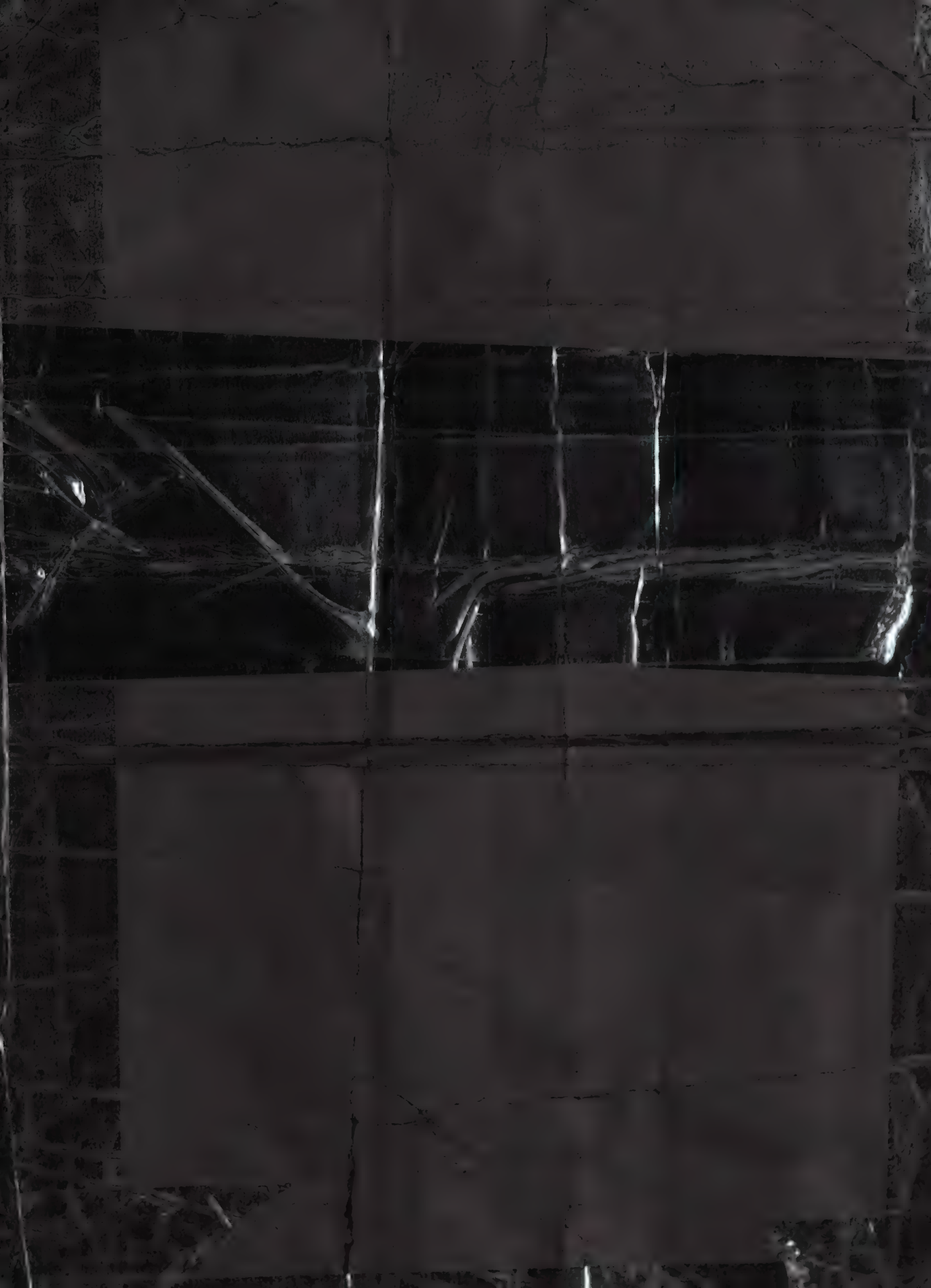


	DESCRIPTION
	PL-5414-O
	umbered 1-99
	mbered 100-199
	umbered 200-299
	umbered 300-399
	nts are numbered 600-699
	ponents are numbered 800-899
	bered 900-999
	list: refer to section 68P81035E28,
	CAPACITOR, fixed: uF ±5%; 500 V: unless otherwise stated
25	.002 ±20%
26	.001 ±20% (2-freq. only)
15	24 pF
15	24 pF (2-freq. only)
17	18 pF
60	68 pF; 200 V
04	.05 +70-20%; 25 V
59	.01 +80-20%; 200 V
51	20 pF
	18 pF
10	220 pF ±20%
18	2 pF
10	220 pF
54	4.25 pF
	20 pF
	NOT USED
04	.01 +80-20%; 200 V
62	51 pF; 100 V
39	36 pF
07	.39 pFFC ±5%
11	3 pF
52	91 pF
03	80 pF
04	.05 +80-20%; 25 V
20	.001 ±10%; 100 V
01	0.1 +80-20%; 25 V
04	1 +150-0%; 50 V
14	.05 +80-20%; 25 V
03	80 pF
52	91 pF
04	.05 +80-20%; 25 V
04	15 +100-0%; 25 V
11	10 +100-0%; 25 V
	43 pF
14	2.4 pF
26	.02 +80-20%; 200 V
59	.01 +80-20%; 200 V
12	100 pF; 300 V
59	.01 +80-20%; 200 V
04	.05 +80-20%; 25 V
06	47 ±20%; 20 V
04	1 +150-0%; 50 V
7	.022 ±10%; 100 V
59	.01 +80-20%; 200 V
8	.033 ±10%; 50 V
1	.082 ±10%; 50 V
59	.01 +80-20%; 200 V
04	1 +150-0%; 50 V
10	220 pF ±20%
01	0.1 +80-20%; 25 V
13	20 +100-0%; 25 V
19	100 +150-10%; 20 V
8	.0068 ±10%; 400 V
18	.0015 ±10%; 100 V
19	100 +150-10%; 20 V
1	0.1 ±20%; 100 V
15	150 pF ±10%; 75 V
9	500 +100-10%; 20 V
	NOT USED
2	51 pF; 100 V
0	220 pF ±20%
3	47 pF; 75 V
0	220 ±20%
8	.033 ±10%; 50 V
0	220 pF ±20%

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C115	8-82905G10	.01[illegible]
C116	21-82428B47	.002; 200 V
C117	8-83813H28	.01; 100 V
C118	8-82905G40	.03; 50 V
C119	21-83596E32	.0011; 200 V
C120	23-84665F04	1 +150-0%; 50 V
C121	21-850510	470 pF ±10[illegible] V
C122	21-82204B51	62 pF; 100 V
C123	21-82372C04	.05 +80-20%; 25 V
C124	23-84665F04	1 +150-0%; 50 V (2-freq. only)
C125	21-850510	470 pF ±10%; 300 V (2-freq. only)
C126	21-82204B51	62 pF; 100 V (2-freq. only)
C127	21-84494B52	91 pF
C128	21-84494B15	300 pF
C129	21-82428B59	.01 +80-20[illegible] V
C130	21-84494B52	91 pF (2-freq. only)
C131	21-84484B15	300 pF (2-freq. only)
C132	21-82428B59	.01 +80-20%; 200 V (2-freq. only)
C133	21-82596E10	220 pF
C134	21-83596E10	220 pF (2-freq. only)
C135	21-82428B59	.01 +80-20[illegible] V
C136	21-82133G39	36 pF
C137	21-82450B29	0.51 pF
C138	21-82187B20	.001 ±10%; 100 V
C139	21-82450B10	4.3 pF
C140	21-83406D18	47 pF
C141	21-863147	150 pF ±10%; 400 V
C142		NOT USED
C143	21-82428B59	.01 +80-20%; 200 V
C144, 145	21-82372C04	.05 +80-20%; 25 V
C146	21-863147	150 pF ±10%; 400 V
C147	21-82610C03	47 pF; 200 V
C148	23-84538G04	15 ±20%; 20 V
C149, 150	21-83596E10	220 pF ±20[illegible]
C151	21-83406D14	8 ±0.5 pF
C152	21-82450B29	0.51 pF
C153	21-82133G21	10 ±0.5 pF
C154	21-82133G41	4.7 ±0.25 pF
C155		NOT USED
C156	21-82204B06	100 pF ±10[illegible]
C157	21-82372C04	.05 +80-20%; 25 V
C158	21-83406D56	24 pF
C159	21-84493B51	6.8 ±0.25 pF
C160, 161		NOT USED
C162	21-83406D56	24 pF
C163	21-83406D64	5.6 ±0.25 pF
C164		NOT USED
C165	21-82877B24	220 pF ±10%; N1400 [illegible] V
C166	21K861427	4 ±.5 pF; N1[illegible] V
C167	21-82428B04	.01 +70-30%; 100 [illegible]
C168	21-82372C03	0.1 +80-2[illegible] 25 V
C169	21-82877B34	150 pF ±10[illegible] V
C211	21-82213E12	.01 ±20%; 1[illegible] V
C212	21-82877B11	10.[illegible] pF, [illegible] V
C213	21-84713A29	[illegible] pF, [illegible]
C214		NOT USE[illegible]
C215	21-82450B46	0.62 pF
C216	21-827[illegible]H56	5 ±[illegible] pF [illegible] V [illegible] Exciter [illegible]
C217		NOT USE[illegible]
C218	23-84538C04	15 ±20%; 20 V
C310	23-84665F0[illegible]	[illegible]
C311	23-84665F03	100 [illegible] V
C312, 313	21-83596E10	220 pF [illegible]
C801, 802	21-83406D77	[illegible] pF
C803	21-84665F01	[illegible]
C804		NOT USE[illegible]
C805	21-83406D77	[illegible] pF
		[illegible]
CR10, 11	48-83510F03	sil[illegible]
CR12	48-82139G01	germa[illegible]
CR13		NOT USE[illegible]
CR14, 15, 16	48-83654H01	sil[illegible]
CR110	48-82190H13	silicon, va[illegible]
CR111	48-82190H13	sil[illegible]
CR112	48-83654H01	[illegible]
CR113	48-83654H01	sili[illegible]
CR114	48-83654H01	[illegible]
CR115	48-82139G01	ger[illegible]
CR116	48-82256C34	[illegible]

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
CR310	48-82466H13	silicon
CR311, 312	48-83654H01	silicon
CR801	48-82466H13	silicon
CR802	48-82256C43	Zener; 9.1 V
		LAMP:
DS910, 911	65-83376K01	14 V
		FUSE:
F901	65-86099	7.5 A, 32 V, 3 AG
		CONNECTOR, receptacle:
J901	-	includes:
	15-83292K01	SHELL, 15-contact
	29-84706E06	CONTACT, female
J902	9-82442E09	female, single contact
		COIL:
L10	24-82835G20	9.3 uH
L11	24-82835G20	9.3 uH (2-freq. only)
L12	24-83601K01	18-1/2 turns; coded white (2-freq. only)
L13	24-83601K01	18-1/2 turns; coded white
L14	24-82723H03	23 uH
L15	24-84972A01	2.5 turns; coded black
L16	24-83884G03	1-1/2 turns; coded brown
L17	24-83884G06	4-1/2 turns; coded white
L18	24-84419D03	33-1/2 turns
L19		NOT USED
L20, 21	24-84419D03	33-1/2 turns
L22	24-82835G22	5.6 uH
L23	24-84419D07	22-1/2 turns (red code)
L24	24-82835G20	9.3 uH
L25 thru 29		NOT USED
L30	24-82723H05	0.41 uH
L110	24-83601K01	18-1/2 turns
L111	24-83601K01	18-1/2 turns (2-freq. only)
L112	24-84972A06	8-1/2 turns (orange code)
L113	24-84972A04	8-1/2 turns (white code)
L114	24-84972A05	8-1/2 turns (red code)
L115	24-84972A26	3-1/2 turns (blue code)
L116	24-82835G13	0.82 uH
L117	24-82135G08	620 uH
L118	24-84972A11	3-1/2 turns (black code)
L119	24C83884G08	5-1/2 turns (orange)
L120	24-83857G09	5-1/2 turns (green code)
L121	24-83961B01	3 turns (brown code)
L122	24-82723H25	2-1/2 turns (white-red code)
L123	24-84881C04	1-1/4 turns
L124	24-82723H01	1.2 mH
L212	24-84798A07	42 nH
L216	24-84641B34	8 turns
L217, 218, 219	24-84641G01	8 turns
L220	24-84641G45	8 turns
L221 thru 224		NOT USED
L225	24-84641G04	8 turns
L226	24-84641G01	8 turns
L227	24-84641G04	8 turns
		SPEAKER, dynamic:
LS901	50-83291K01	4 ohm impedance; 3-1/2"
		CONNECTOR, plug:
P901	-	includes: 15-83293K01 SHELL; 29-84706E05 TERMINALS, male
		TRANSISTOR: (SEE NOTE I)
Q10	48-869494	NPN; type M9494
Q11	48-869662	NPN; type M9662
Q12, 13	48-869494	NPN; type M9494
Q14 thru 17	48-869642	NPN; type M9642
Q18	48-869571	NPN; type M9571
Q110	48-869643	PNP; type M9643
Q111	48-869642	NPN; type M9642
Q112	48-869643	NPN; type M9643
Q113	48-869642	NPN; type M9642
Q114, 115	48-869643	PNP; type M9643
Q116	48-869640	NPN; type M9640
Q117	48-869494	NPN; type M9494 (2-freq. only)
Q118, 119	48-869494	NPN; type M9494
Q120	48-869638	NPN; type M9638
Q121	48-869657	NPN; type M9657

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
Q122	48-869887	NPN; type M9887
Q211	48-869533	FET; type M9533
Q310	48-869643	PNP; type M9643
Q801, 802	48-869643	PNP; type M9643
		RESISTOR, fixed: ±10%; 1/4 W unless otherwise stated
R10	6-124A89	47k ±5%
R11	6-124A89	47k ±5% (2-freq. only)
R12	6-124C59	2.7k
R13	6-124C59	2.7k (2-freq. only)
R14	6-124C45	680
R15	6-124C73	10k
R16	6-124C45	680 (2-freq. only)
R17	6-124C39	390
R18	6-124C73	10k
R19		NOT USED
R20	6-124C59	2.7k
R21	6-124C19	56
R22	6-124C25	100
R23, 24		NOT USED
R25	6-124A33	220 ±5%
R26		NOT USED
R27	6-124C69	6.8k
R28	6-124C83	27k
R29	6-124C47	820
R30	6-124C61	3.3k
R31	6-124C83	27k
R32	6-124C69	6.8k
R33	6-124C47	820
R34	6-124C61	3.3k
R35		NOT USED
R36	6-124C39	390
R37	6-124C13	33
R38	6-124C17	47
R39	6-124C85	33k
R40	6-124D06	220k
R41	6-124A89	47k ±5%
R42	6-124C73	10k
R43	6-124C59	2.7k
R44	6-124B24	1.2 meg ±5%
R45	6-124A89	47k ±5%
R46	18-83287K01	variable: 100k ±30%
R47	6-124A83	27k ±5%
R48	6-124A79	18k ±5%
R49	6-124A43	560 ±5%
R50	6-124A49	1k ±5%
R51	6-124A92	62k ±5%
R52	6-124A78	16k ±5%
R53	6-124C43	560
R54	6-124C57	2.2k
R55	6-124C67	5.6k
R56	18-83288K01	variable; 100k ±30% (incl. S901
R57	6-124C25	100
R58	6-124A17	47 ±5%
R59	6-125B70	1 ±5%; 1/2 W
R60		NOT USED
R61	6-124C77	15k
R62	6-124C41	470
R63	6-124D06	220k ±10%
R64	6-124C01	10
R65, 66, 67		NOT USED
R68	6-125A25	100 ±5%; 1/2 W
R69	6-125A25	100 ±5%; 1/2 W (2-freq. only)
R70	17-82036G13	0.75 ±5%; 2 W
R110	6-124C47	820
R111	6-124A83	27k ±5%
R112	6-124A26	110 ±5%
R113, 114	6-124A93	68k ±5%
R115	6-124A83	27k ±5%
R116	6-124A26	110 ±5%
R117	6-124A65	4.7k ±5%
R118, 119	6-124A67	5.6k ±5%
R120	6-124A76	13k ±5%
R121, 122	6-124A71	8.2k ±5%
R123	6-124C59	2.7k
R124	6-124A71	8.2k ±5%
R125	6-124C59	2.7k
R126	18-84944C02	variable; 25k ±20%
R127	6-124C67	5.6k
R128	6-124B02	150k ±5%
R129	6-124B04	180k ±5%
R130, 131	6-124A69	6.8k ±5%



REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R132, 133	6-124C49	1k
R134	6-124A59	2.7k ±5%
R135	6-125A25	100 ±5%; 1/2 W
R136	18-84944C02	variable; 25k ±20% (2-freq. only)
R137	6-124C67	5.6k (2-freq. only)
R138	6-124B02	150k ±5% (2-freq. only)
R139	6-124B04	180k ±5% (2-freq. only)
R140	6-125A25	100; 1/2 W (2-freq. only)
R141	6-124A65	4.7k ±5% (2-freq. only)
R142	6-124C75	12k ±5% (2-freq. only)
R143	6-124A49	1k ±5% (2-freq. only)
R144	6-124A65	4.7k ±5%
R145	6-124A75	12k ±5%
R146	6-124A49	1k ±5%
R147	6-124A73	10k ±5%
R148	6-124A67	5.6k ±5%
R149	6-124A83	27k
R150	6-124A19	56
R151		NOT USED
R152	6-124C33	220
R153	6-124A29	150 ±5%
R154	6-124C27	120
R155	6-124A33	220 ±5%
R156	6-124B61	4.7 ±5%
R157	6-124A17	47 ±5%
R158		NOT USED
R159	17-83122D09	22; 3 W
R160	6-124A63	3.9k
R161	6-124A33	220
R162	6-125A09	22; 1/2 W
R163	6-124C53	1.5k
R212	6-185B83	2.2k; 1/8 W
R213	6-185B93	15k; 1/8 W
R311	6-124A10	24 ±5%
R312	6-124C51	1.2k
R801	17-82036G48	0.1 ±5%; 2 W
R802	6-125C23	82 ±5%; 1/2 W
R803	6-124A49	1k ±5%
R804	18-84944C01	variable; 2k ±20%
R805	6-124A43	560 ±5%
R806	6-124A17	47 ±5%
R807	6-124A49	1k ±5%
		THERMISTOR:
RT101	6-83600K01	1k @ 25°C
		SWITCH:
S901	-	part of Volume Control R56
S903	40-83290K03	dpdt (2-freq. only)
		INTEGRATED CIRCUIT: (SEE NOTE I)
U10	51-84320A78	M2078
U11	51-84320A77	M2077
		VOLTAGE REGULATOR:
VR2	48-82256C50	Zener; 13 V
VR313	48-82256C56	Zener; 8.8 V
		CRYSTAL: (SEE NOTE II)
Y10, 11	-	KXN6122AA
Y20	48-84574K01	10.7 MHz
Y21, 22	48-84574K04	10.7 MHz
Y100, 160	-	KXN6121AA
		NON-REFERENCED ITEMS (RECEIVER)
	1-80785B68	CABLE ASSEMBLY includes:
	42-10217A02	STRAP, cable harness; 8 req'd.
		CONNECTOR J601
	5-10277A17	GROMMET, plastic (.252" ID)
	26-82048L01	SHIELD, coil (.203" hole)
	26-83264F01	SHIELD, coil (.312" hole)
	26-84480G01	SHIELD, coil (.231" hole)
	26-84716D01	HEATSINK (.315" ID x .807"L)
	2-10054A74	NUT, spring: 6-32
	3-125347	SCREW, tapping
	4-84511K01	WASHER, shoulder
	7-83134K01	BRACKET, heatsink
	14-83572K01	INSULATOR, transistor
	26-83294K01	SHIELD, cover

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	27-84947K01	CHASSIS (2.125 x 6.230 x 6.640")
	42-10217A02	STRAP, cable harness
		NON-REFERENCED ITEMS (EXCITER)
	9-83487K01	SOCKET (for Y100 & Y16
	26-84598A01	SHIELD, coil (.300" hole 6 req'd.
	14-861196	INSULATOR, transistor (for Q121)
	26-84598A02	SHIELD, coil (.500" hole 2 req'd.
	1-80784B40	HEATER ASSEMBLY includes:
		THERMISTOR RT101
		RESISTOR R135
		NON-REFERENCED ITEMS (RF DECK)
	3-1465	SCREW, machine: 4-40 x 3/16"; 12 req'd.
	14-84886A01	INSULATOR, standoff; 1
	1-80785B32	FILTER HOUSING ASSEM includes:
	15-84402K04	HOUSING
	29-84883C01	TERMINAL, standoff
	14-84989K01	INSULATOR, transistor (.225" dia.)
	1-80748B42	COVER ASSEMBLY, 3-ce includes:
	2-84773E04	NUT, tension: 3 req'd
	3-84589G01	SET SCREW: 5-40 x 7 3 req'd.
	15-84396G01	COVER, 3-cell
	1-80748B43	COVER ASSEMBLY, 4-ce includes:
	2-84773E04	NUT, tension; 4 req'd.
	3-84589G01	SET SCREW: 5-40 x 7 4 req'd.
	15-84394G01	COVER, 4-cell
	1-80748B44	COVER ASSEMBLY, 5-ce includes:
	2-84773E04	NUT, tension; 5 req'd.
	3-84589G01	SET SCREW: 5-40 x 7 5 req'd.
	15-84397G01	COVER, 5-cell
		NON-REFERENCED ITEMS (MAIN BOARD)
	9-83396K02	LAMPHOLDER, wedge ba (.870" long)
	9-83396K03	LAMPHOLDER, wedge ba (.562" long)
		OTHER NON-REFERENCED ITEMS
	9-83396K02	SOCKET, lamp; for DS9
	9-83396K03	SOCKET, lamp; for DS9
	38-83138K02	BUTTON, push
	15-83128K03	
	33-84126L01	NAME PLATE
	33-84253L02	NAME PLATE,
	3b-83132B02	KNOB, control

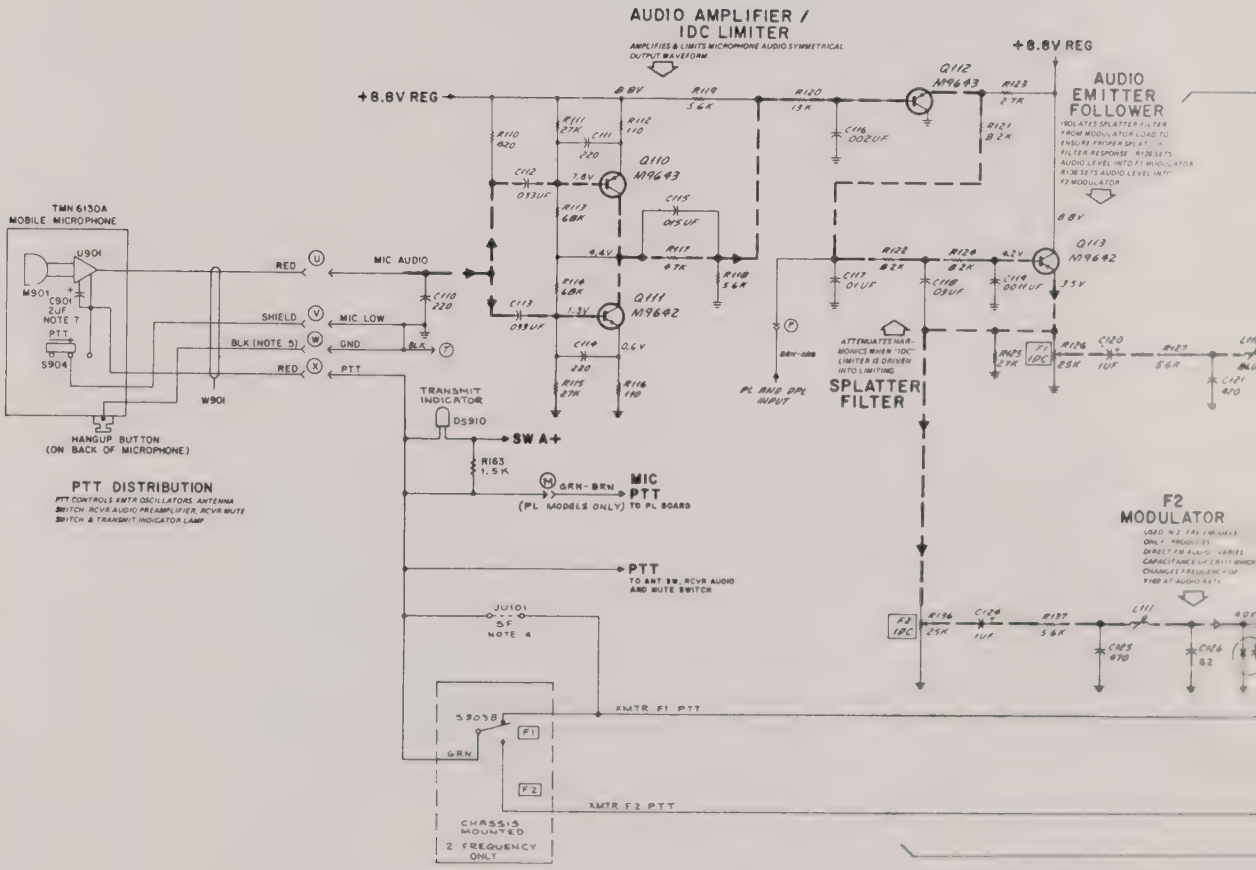
NOTES:

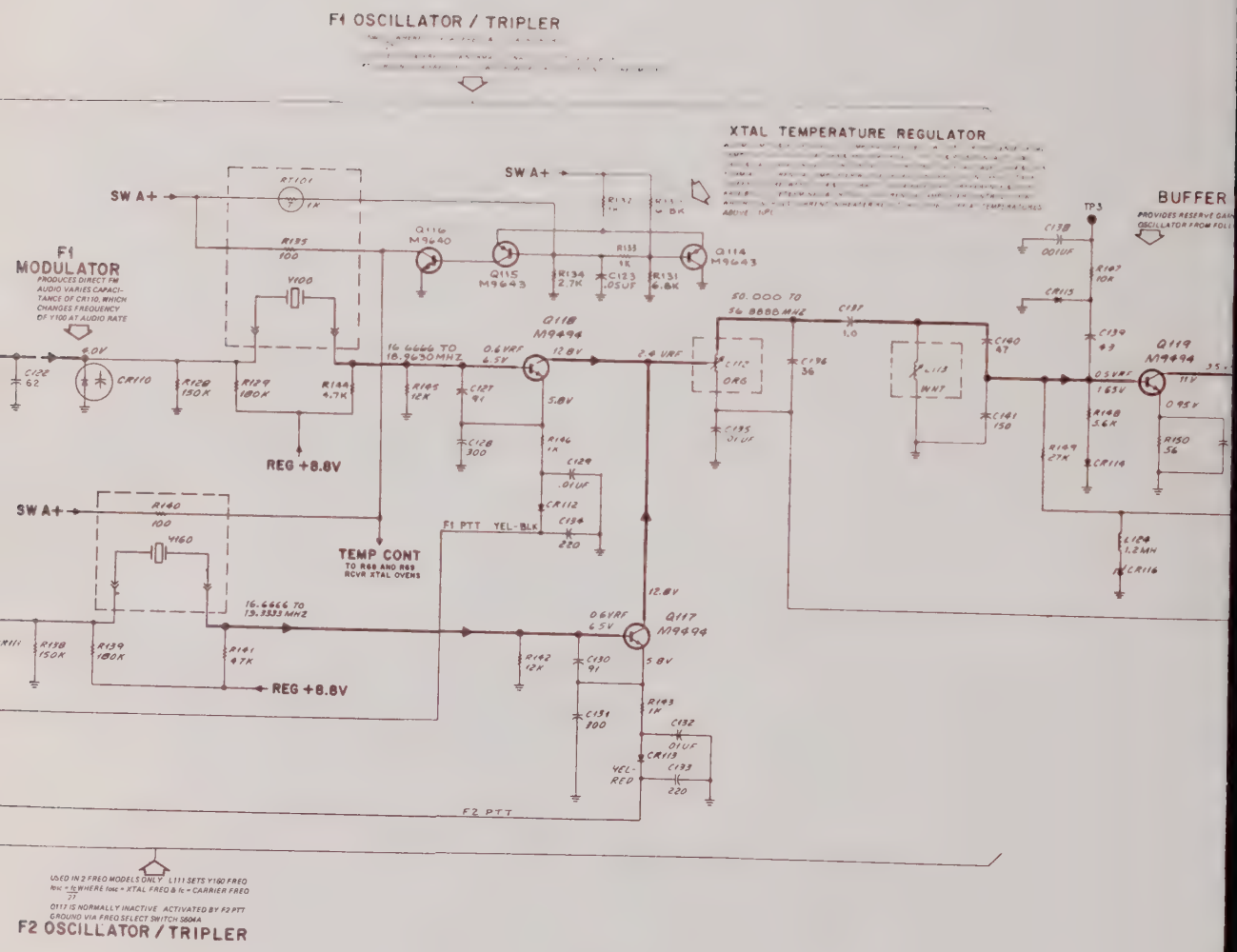
I. For optimum performance, replacement [illegible], transistors and integrated circuits must be ordered by Motorola part number.

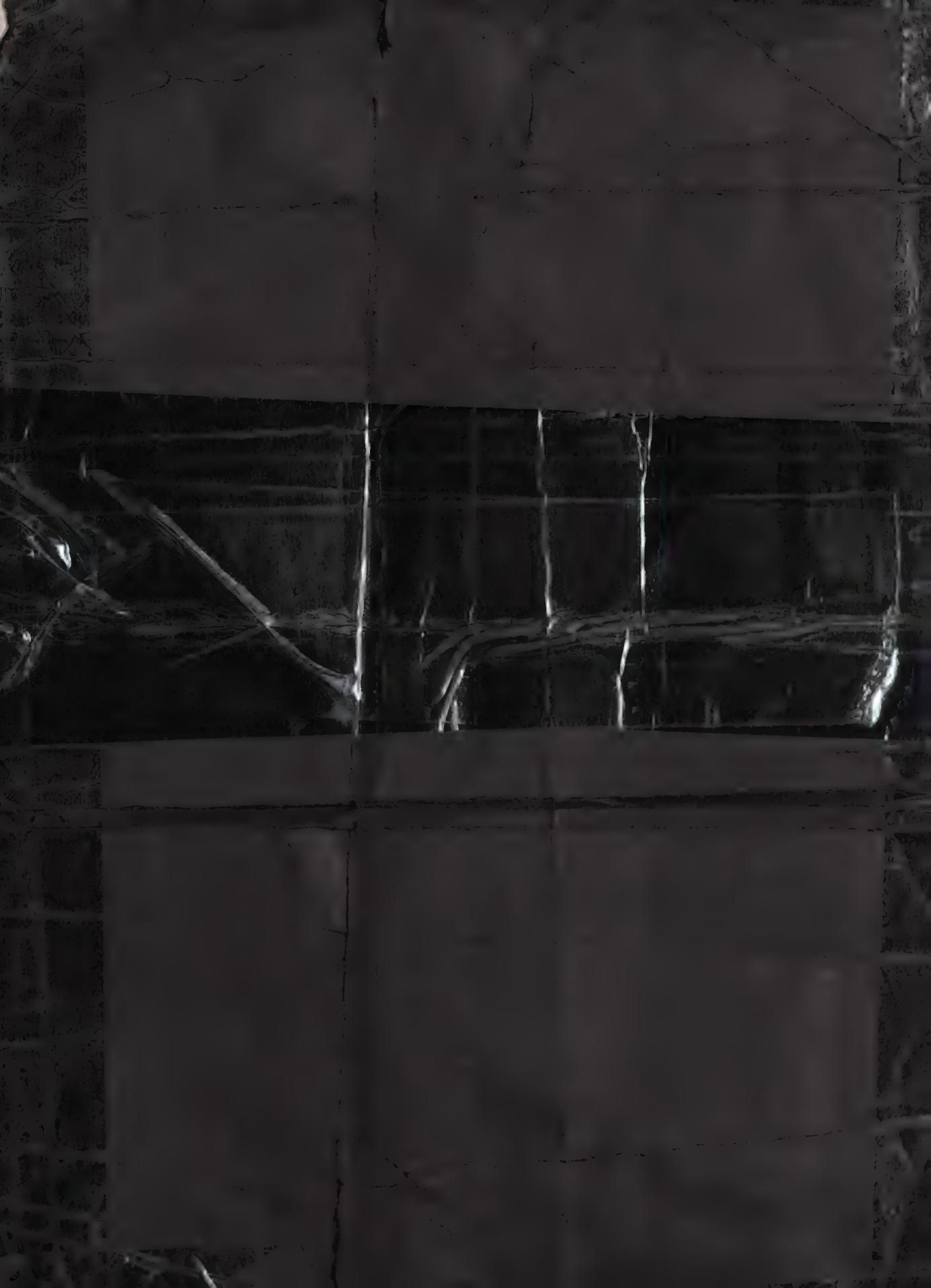
II. When ordering quartz crystal units or ceramic resonators specify carrier frequency, crystal or resonator type and crystal for resonator type number.

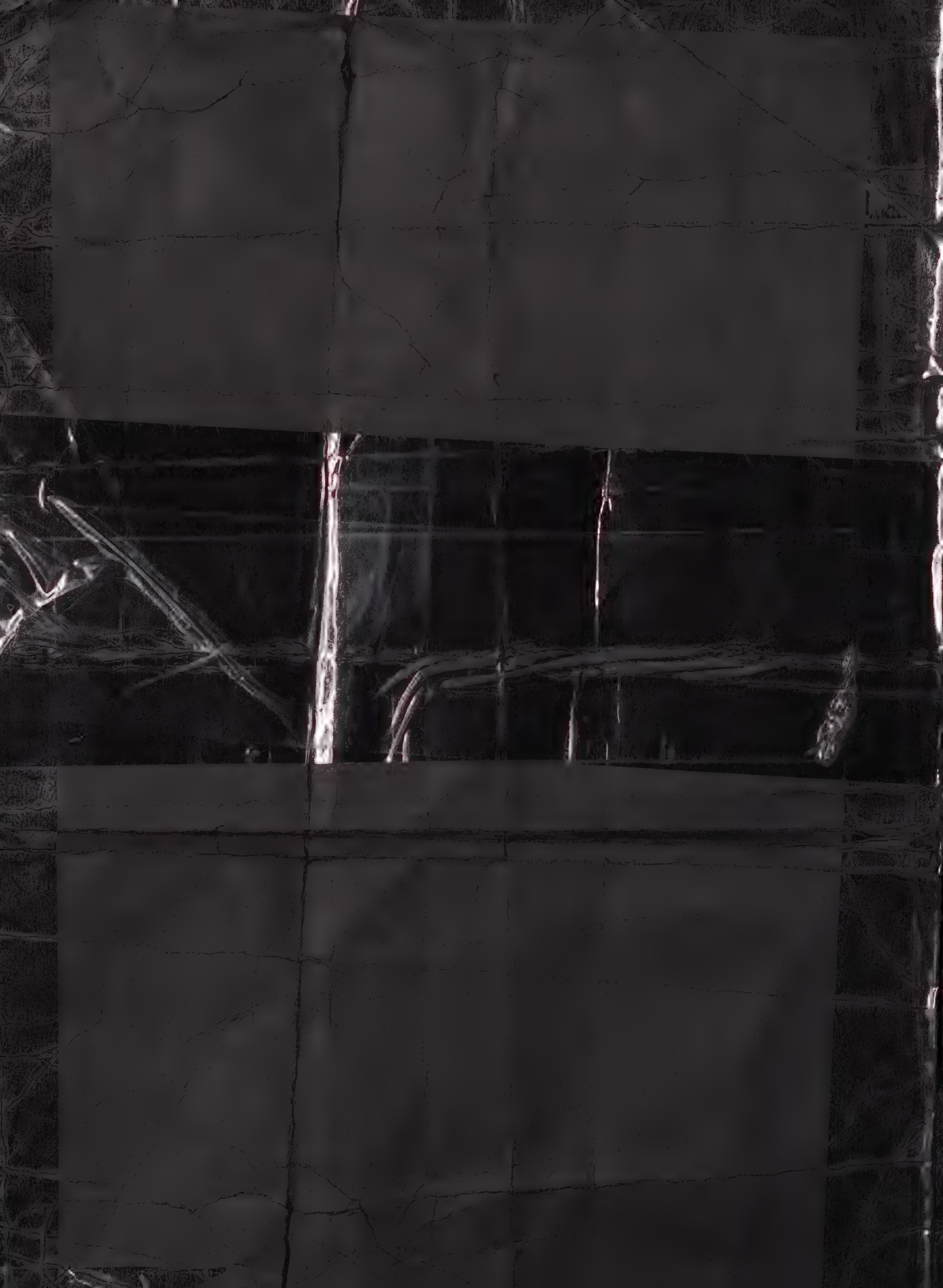
TMN6130A Mobile Microphone PL-5333-A

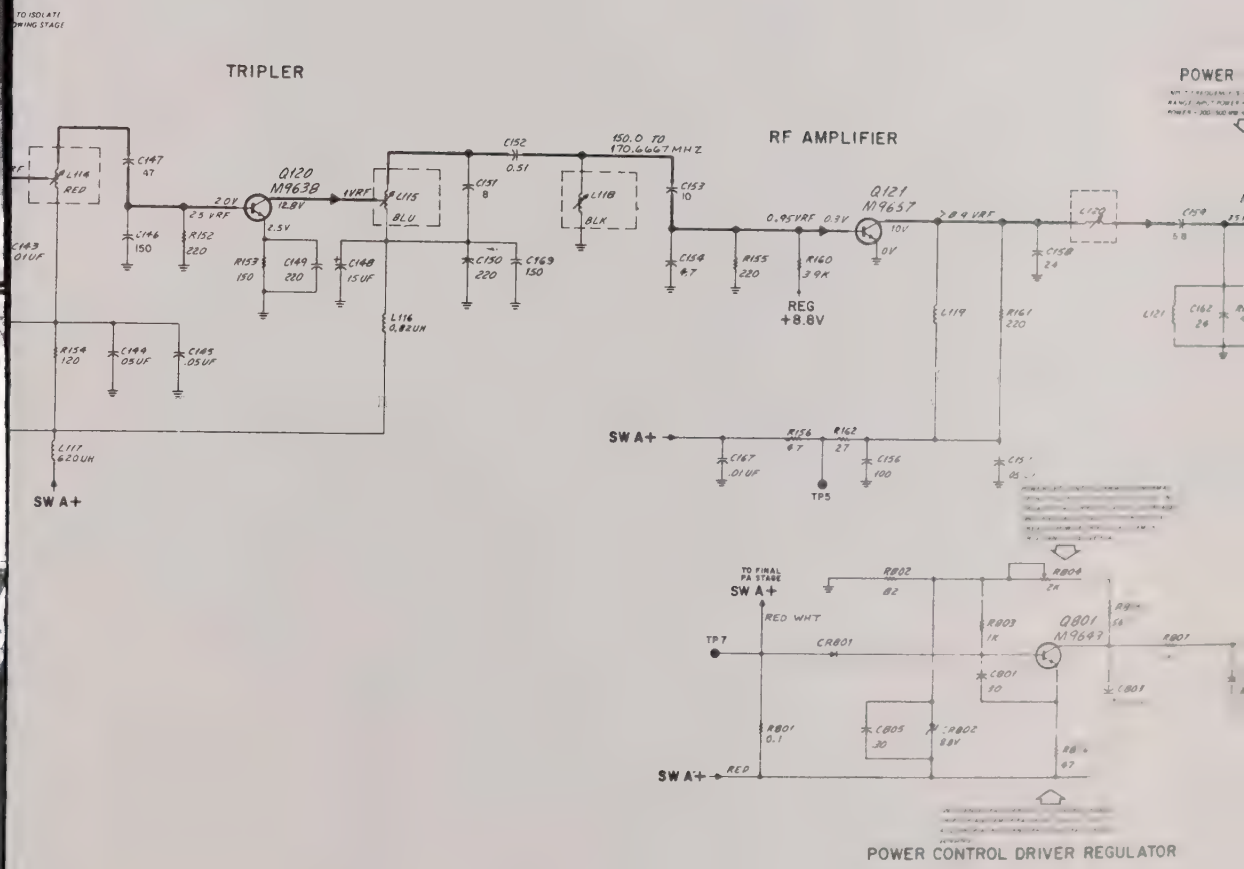
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed:
C901	23-84669A27	2 uF
		SWITCH, slide:
S904	40-84622B07	dpdt
		HYBRID CIRCUIT:
Z901	~~51-84333G79~~	hybrid preamplifier
		CORD, microphone; coiled:
W901	30-83586L01	4 conductor; includes 39-10184A24 TERMINAL PIN (4 req'd.) female 29-83277G02 LUG (4 req'd.) 41-83576L01 SPRING, strain relief
	NON-REFERENCED ITEMS	
	50-83905L01	DYNAMIC CARTRIDGE
	33-83577L01	NAMEPLATE
	33-83574L01	PUSHBUTTON
	3-139797	SCREWS, tapping; #5-20 x 5/8"; 3 req'd.
	4-001725	WASHER, flat
	4-82707B01	WASHER, flat
	5-855939	RIVET, shoulder
	15-83572L01	HOUSING, back
	15-83573L01	HOUSING, front
	29-005247	LUG
	35-83575L01	GRILL CLOTH


AUDIO AMPLIFIER / IDC LIMITER
AMPLIFIES & LIMITS MICROPHONE AUDIO SYMMETRICAL OUTPUT WAVEFORM
+8.8V REG
Q112 MM9643
AUDIO EMITTER FOLLOWER
ISOLATES SPLATTER FILTER FROM MODULATOR LOAD TO ENSURE PROPER SPLATTER FILTER RESPONSE. R136 SETS AUDIO LEVEL INTO F1 MODULATOR. R138 SETS AUDIO LEVEL INTO F2 MODULATOR
Q110 MM9643
Q111 MM9692
Q113 MM9692
TMN 6130A MOBILE MICROPHONE
U901
M901
C901 2uF NOTE 7
PTT
S904
HANGUP BUTTON (ON BACK OF MICROPHONE)
W901
RED
SHIELD
BLK (NOTE 5)
RED
MIC AUDIO
MIC LOW
GND
PTT
TRANSMIT INDICATOR
DS910
SW A+
R163 1.5K
GRN-BRN
MIC PTT
(PL MODELS ONLY) TO PL BOARD
PTT
TO ANT SW, RCVR AUDIO AND MUTE SWITCH
J1101
SF
NOTE 4
S903B
GRN
F1
F2
CHASSIS MOUNTED 2 FREQUENCY ONLY
XMTR F1 PTT
XMTR F2 PTT
PL AND DPL INPUT
ATTENUATES HARMONICS WHEN "IDC" LIMITER IS DRIVEN INTO LIMITING
SPLATTER FILTER
F2 MODULATOR
PTT DISTRIBUTION
PTT CONTROLS XMTR OSCILLATORS, ANTENNA SWITCH, RCVR AUDIO PREAMPLIFIER, RCVR MUTE SWITCH & TRANSMIT INDICATOR LAMP

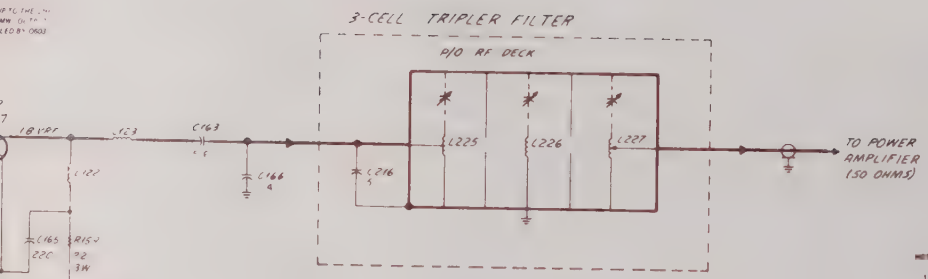

F1 OSCILLATOR / TRIPLER
XTAL TEMPERATURE REGULATOR
BUFFER
SW A+
RT101
1K
R135
100
Y100
F1
MODULATOR
PRODUCES DIRECT FM
AUDIO VARIES CAPACI-
TANCE OF CR110, WHICH
CHANGES FREQUENCY
OF Y100 AT AUDIO RATE
4.0V
C132
62
CR110
R128
150K
R129
180K
R144
4.7K
REG +8.8V
Q116
M9640
Q115
M9643
R134
2.7K
C123
.05UF
R133
1K
R131
6.8K
Q114
M9643
R132
1K
6.8K
16.6666 TO
18.9630 MHZ
0.6VRF
6.5V
Q118
M9494
12.8V
2.4 VRF
C127
91
5.8V
C128
300
R146
1K
C129
.01UF
CR112
C134
220
F1 PTT YEL-BLK
TEMP CONT
TO R68 AND R69
RCVR XTAL OVENS
50.000 TO
56.8888 MHZ
C137
1.0
C112
ORG
C135
.01UF
C136
36
L113
WHT
C140
47
C141
150
TP3
C138
.001UF
R107
10K
CR113
C139
43
0.3VRF
1.65V
R108
5.6K
R109
27K
CR114
Q119
M9494
11V
0.95V
R150
56
L120
1.2MH
CR116
SW A+
R140
100
Y160
16.6666 TO
19.3333 MHZ
R138
150K
R139
180K
R141
47K
REG +8.8V
12.8V
0.6VRF
6.5V
Q117
M9494
R142
12K
C130
91
5.8V
C131
300
R143
1K
C132
.01UF
CR113
YEL-
RED
C133
220
F2 PTT
USED IN 2 FREQ MODELS ONLY. L111 SETS Y160 FREQ
fxtc = fc/N WHERE fxtc = XTAL FREQ & fc = CARRIER FREQ
77
Q117 IS NORMALLY INACTIVE ACTIVATED BY F2 PTT
GROUND VIA FREQ SELECT SWITCH S604A
F2 OSCILLATOR / TRIPLER






TRIPLER
RF AMPLIFIER
POWER
Q120
M9638
Q121
M9657
Q801
M9647
150.0 TO
170.6667 MHZ
REG
+8.8V
SW A+
TP5
TP7
RED WHT
RED
TO FINAL
PA STAGE
POWER CONTROL DRIVER REGULATOR

PLER



DESCRIPTION	460-470 MHz	VERSION
MAIN BOARD, ONE FREQ.	TLE4073A	D
MAIN BOARD, TWO FREQ.	TLE4083A	D

LEGEND
- THEORY OF OPERATION DATA
- PRIMARY RF SIGNAL FLOW
- PRIMARY AUDIO SIGNAL FLOW

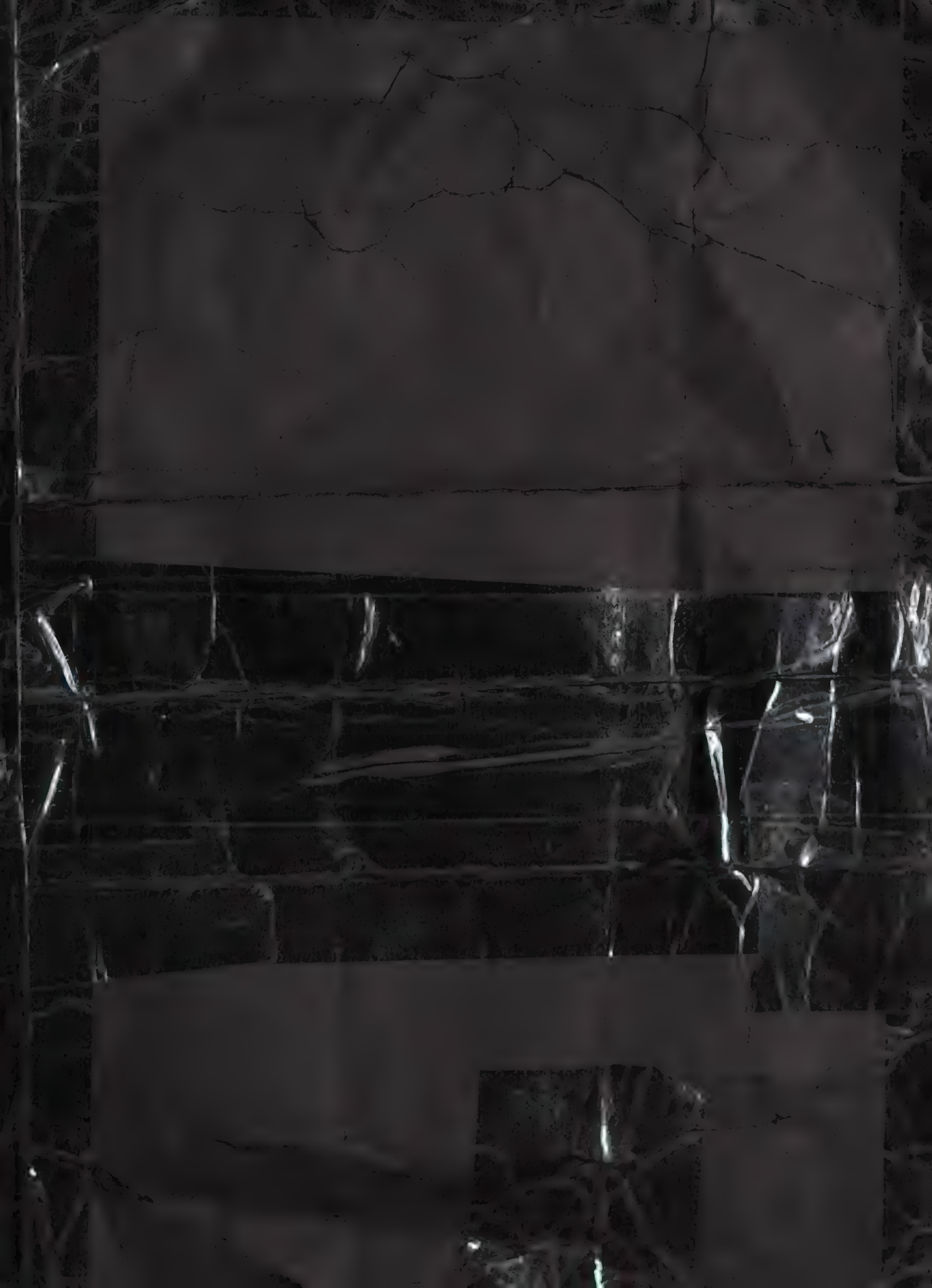
EEPS-23700-A

NOTES

1. COMPONENTS MARKED HAVE DIFFERENT VAL ON DIFFERENT RADIO OMITTED ON SOME MO PARTS LIST
2. UNLESS OTHERWISE NO IN OHMS AND CAPACIT FARADS
3. UNLESS OTHERWISE NI MEASURED WITH A 20 C AND RF VOLTAGES AR
4. JUMPER CONNECTIONS TABLE

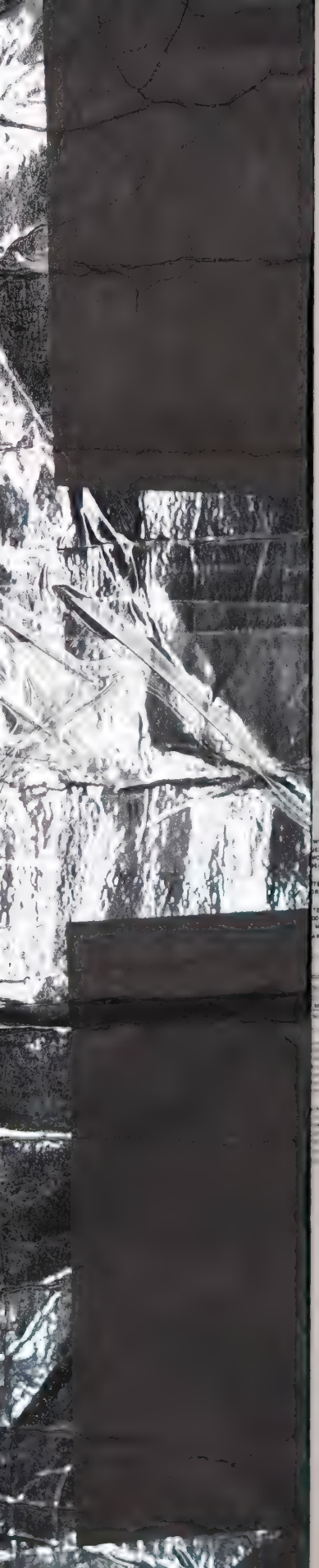
JUMPER NUMBER	
JU1	SINGLE FREQUE
JU2	CARRIER SQUEL PRIVATE-LINE
JU101	SINGLE-FREQUE MODELS
JU301	ALL MODELS

5. IN CARRIER SQUELCH PHONE WIRE S CONNE AND OPL MODELS THE TO THE ORG RED WIRE USING AN IN-LINE CO SCHEMAT C O AGRAM DETAILS
6. CONNECTIONS ARE SHO MOBILE MICROPHONE NECTIONS SEE SECTIO INFORMATION FOR THE HANGUP BOX IS PROVI
7. CAPACITOR (901 IN THE PHYSICALLY MOUNTED PTT SWITCH



UNIFIED CHASSIS

EXCITER SECTION



WITH AN ASTERISK MAY
ES (OR TYPE NUMBERS)
MODELS OR MAY BE
ALS. SEE UNIFIED CHASSIS

TED. RESISTOR VALUES ARE
OR VALUES ARE IN PICO-

TED DC VOLTAGES ARE
20 OHMS PER VOLTMETER
ME ASURED WITH AN RF VOLTMETER
ARE SHOWN IN THE FOLLOWING

IN	OUT
Y RECEIVE MODELS	TWO FREQUENCY RECEIVER MODULES
MODELS	TONE CODED PRIVATE-LINE MODELS
V TRANSMITTER	TWO FREQUENCY TRANSMITTER MODELS
	OPTIONAL DISABLES PWR ON LAMP

S THE BLACK MICRC

A TION MODEL TYPE NO

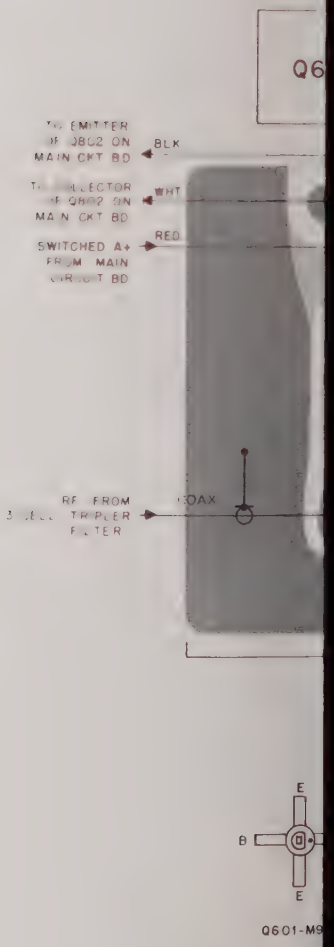
WITH THE HANDSET

FUNCTION

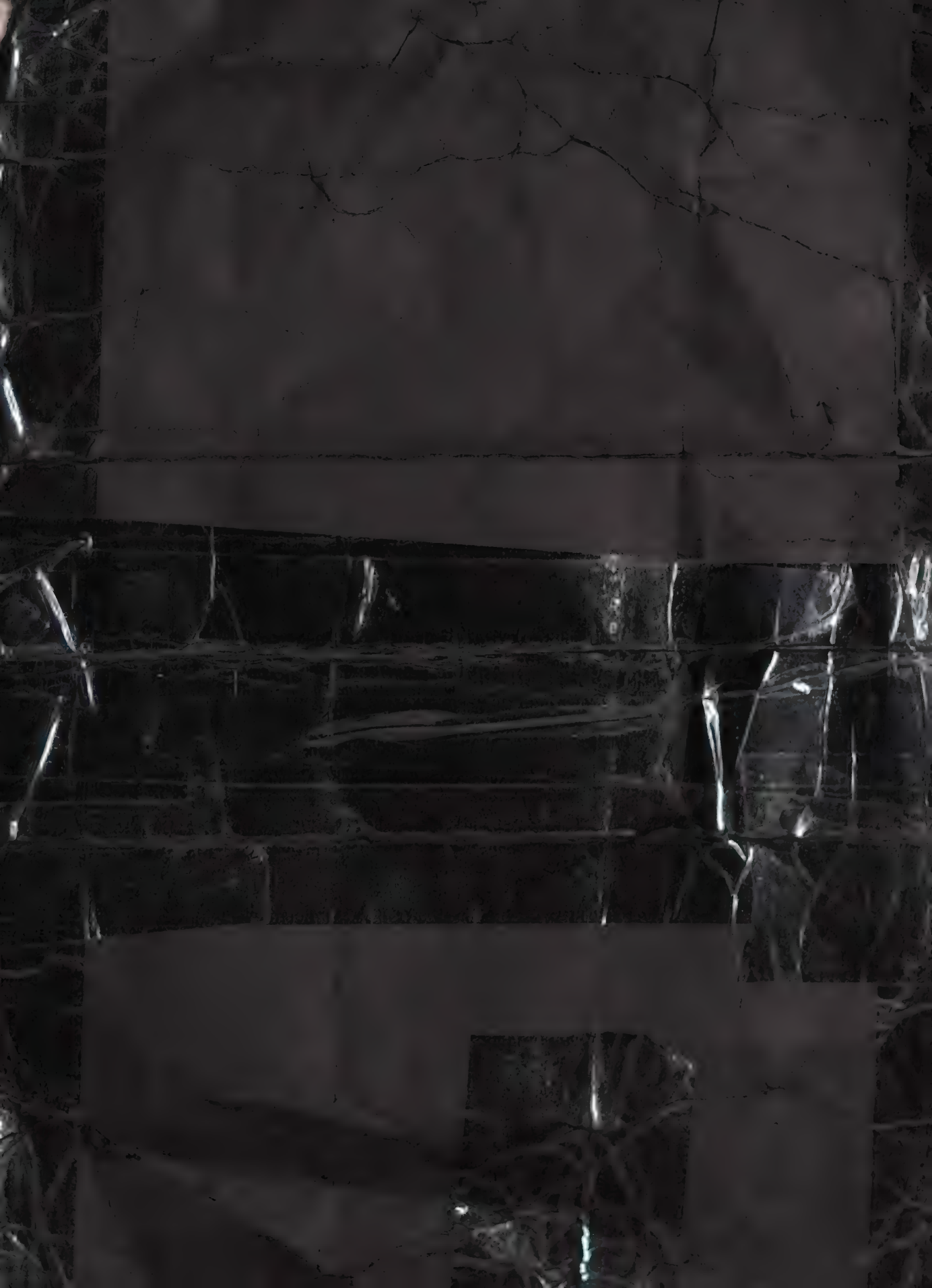
Amplifies voice signals from the microphone and produces a low-level FM modulated rf signal for the rf power amplifier.

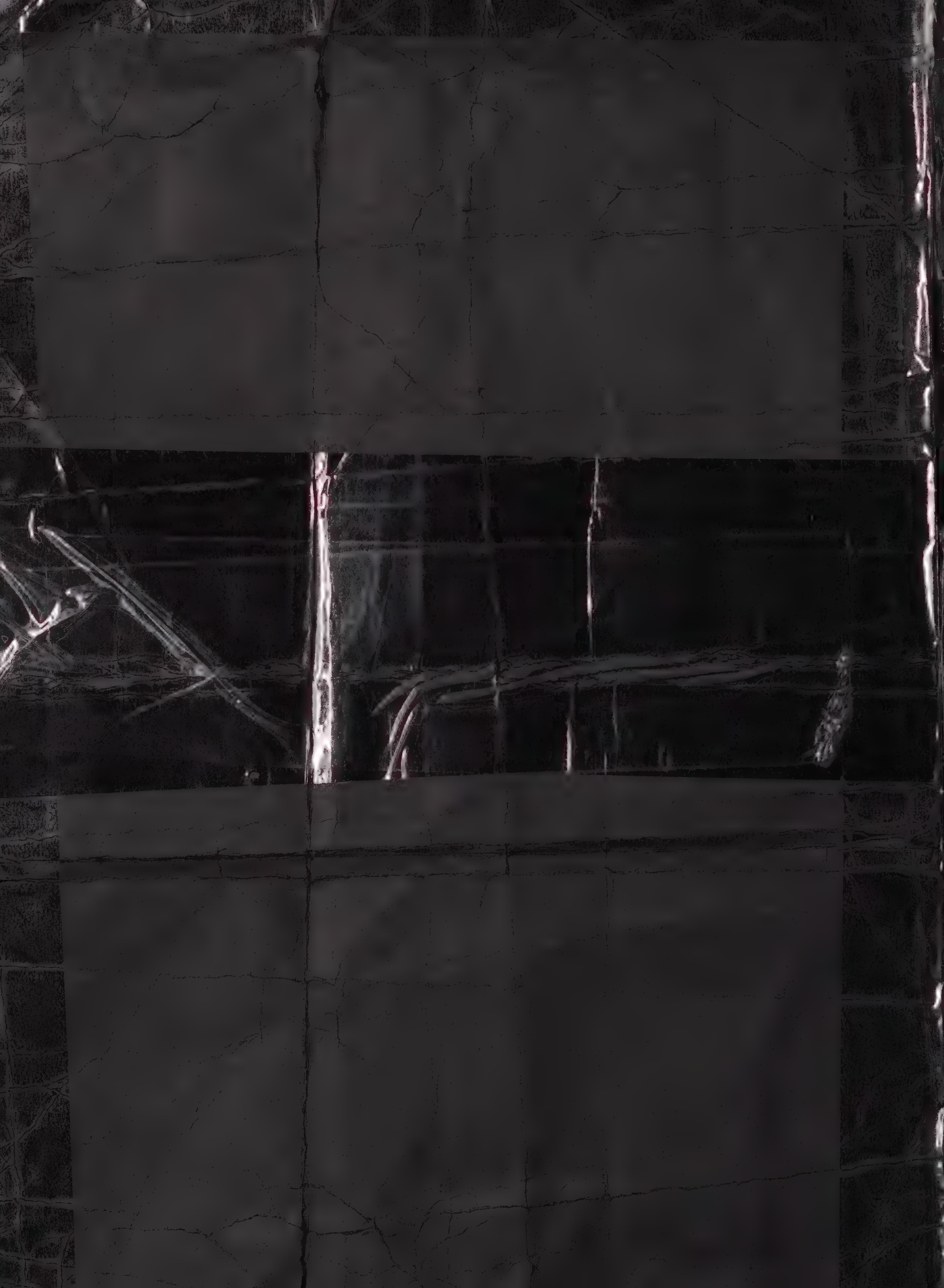
10-WATT RF POWER AMPLIFIER HARMONIC FILTER, AND ANTENNA SWITC

MODEL TLE1863A



68P81035E28-O
(Sheet 1 of 2)
5/25/77-NPC





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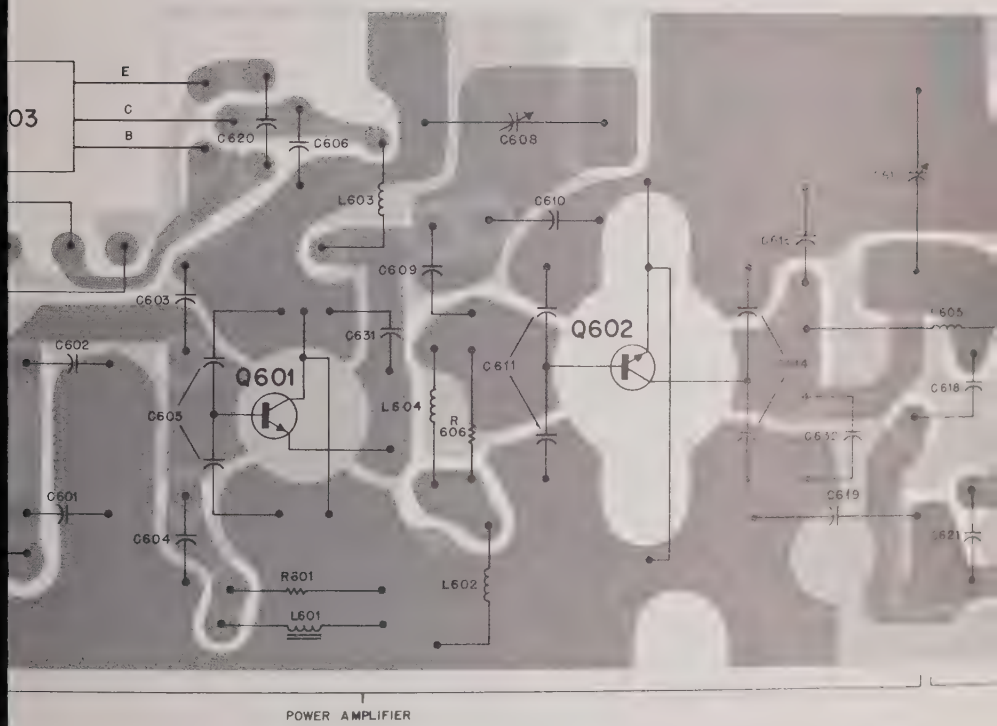
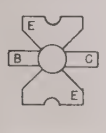


SHOWN FROM COMPONENT SIDE

TRANSISTOR BASE DETAILS



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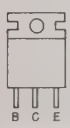
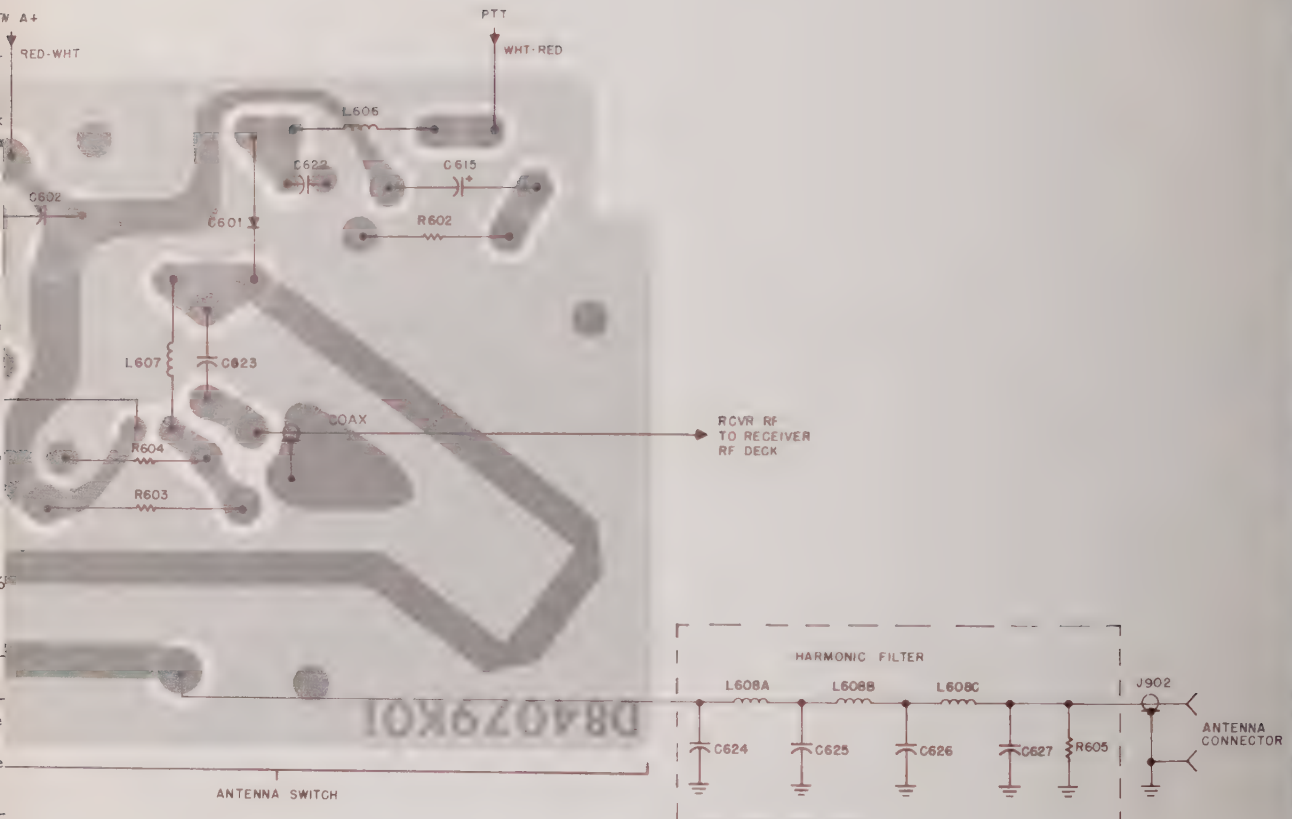


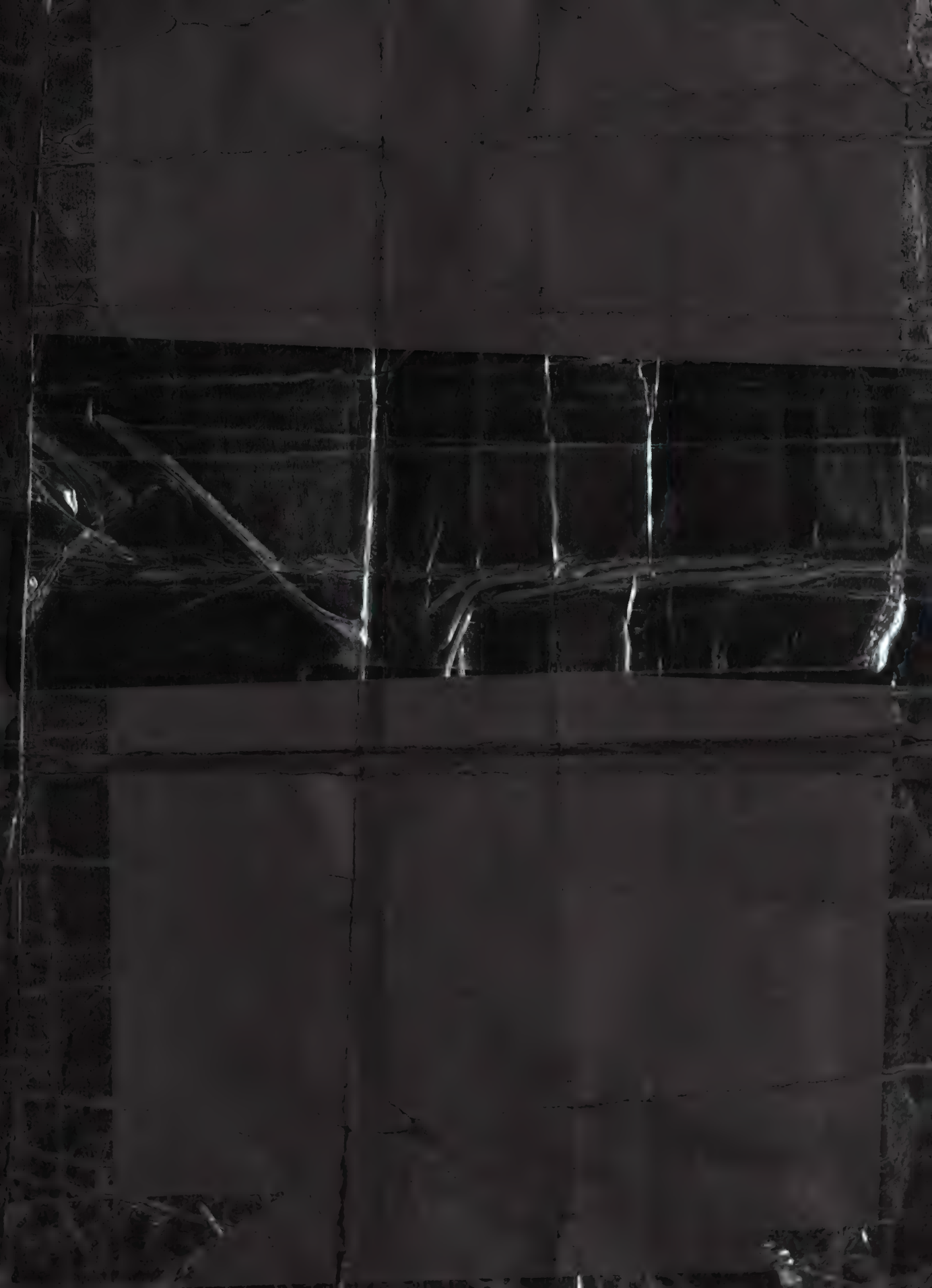
Q603-M9647



SOLDER SIDE BD-DEPS-22125-0
COMPONENT SIDE BD-DEPS-22124-0
OL-DEPS-23832-A

NOTE

THE HARMONIC FILTER COMPONENTS ARE LOCATED BELOW THE PA BOARD WITHIN THE PA HOUSING



PARTS LIST

TLE1863A Power Amplifier (450-470 MHz) PL-5415-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, fixed: pF ±5%; 500 V; unless otherwise stated
C601	21-83406D54	4 ±0.25 pF
C602	21-83406D90	11
C603	21-83406D97	15
C604	21-83406D93	16
C605		part of PK817 kit (SEE NOTE 2)
C606	21-82428B04	.01 uF +70-30%; 100 V
C607	8-82905G01	.01 uF ±10%; 50 V
C608	20-83201B11	variable; 1.8 to 20 pF; 400 V
C609	21-84494B37	11
C610	21-83406D52	2
C611		part of PK818 kit (SEE NOTE 2)
C612	21-82428B04	.01 uF +70-30%; 100 V
C613		NOT USED
C614		P/O PK818 kit (SEE NOTE 2)
C615	23-83397D01	3.3 uF ±20%; 25 V
C616	21-84494B37	11
C617	20-83201B11	variable; 1.8 to 20; 400 V
C618	21-84494B11	200
C619	21-83406D65	5 ±.25; NP0
C620	21-83406D77	30
C621	21-84494B04	100
C622	21-82358G78	14.3 ±2%; 25 V
C623	21-84494B04	100
C624	21-83366K06	10 ±0.25 pF; 1700 V
C625, 656	21-83366K07	32; 1700 V
C627	21-83366K06	10 ±0.25 pF; 1700 V
C628	23-84665F01	10 uF +100-0%; 25 V
C629, 630	21-861219	1000 +100-0%
C631	21-84494B36	13
C632	21-832501	.01 uF +60-40%; 250 V
		DIODE: (SEE NOTE 1)
CR601	48-83510F03	silicon
		CONNECTOR, receptacle:
J602	9-82442E06	coaxial; chassis mounted
		COIL:
L601	24-83961B01	3-turns; coded brown
L602		NOT USED
L603	24-84614A01	3-1/2 turns
L604	24-83961B01	3 turns; coded brown
L605	30-10286A72	wire #24 gauge solid insulation 1"
L606, 607	24-82723H01	1.2 uH
L608	42-84438K01	fixed wire loop
		TRANSISTOR: (SEE NOTE 1)
Q601		part of PK817 kit (SEE NOTE 2)
Q602		part of RPX4038A (SEE NOTE 2)
Q603	48-869647	PNP, M9647
		RESISTOR, fixed: ±10%; 1/4 W; unless otherwise stated
R601	6-124A07	18 ±5%
R602	6-124D55	2.7
R603	6-125C47	820; 1/2 W
R604	6-124C63	3.9k
R605	6-125C97	100k; 1/2 W
		NON-REFERENCED ITEMS
	76-83960B01	FERRITE BEAD: (.047 x .138 x .118")
	1-80785B63	CAPACITOR ASSEMBLY includes:
	4-83755H01	WASHER, shoulder
	64-84605K01	PLATE, mounting
		CAPACITORS C629 & C630
	1-80785B64	CAPACITOR & RESISTOR ASSEMBLY includes:
	64-84437K01	PLATE, filter
		COMPONENTS C624 thru C627, R605 & L608
	2-7003	NUT, 8-32 x 5/16 x 1/8
	3-129997	SCREW, machine: 4-40 x 5/16 3 req'd.

REFERENCE SYMBOL	MOTOR PART
	3-13418
	3-13418
	3-13421
	3-13957
	4-84152
	14-8426
	14-8443
	14-8444
	26-8441
	76-8406
	42-1012

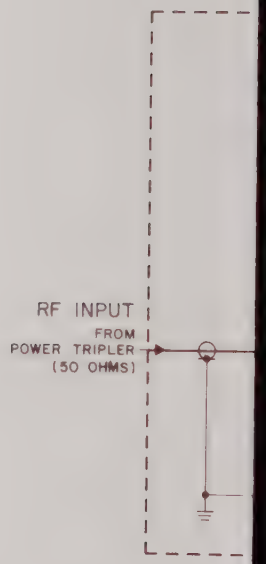
NOTES:

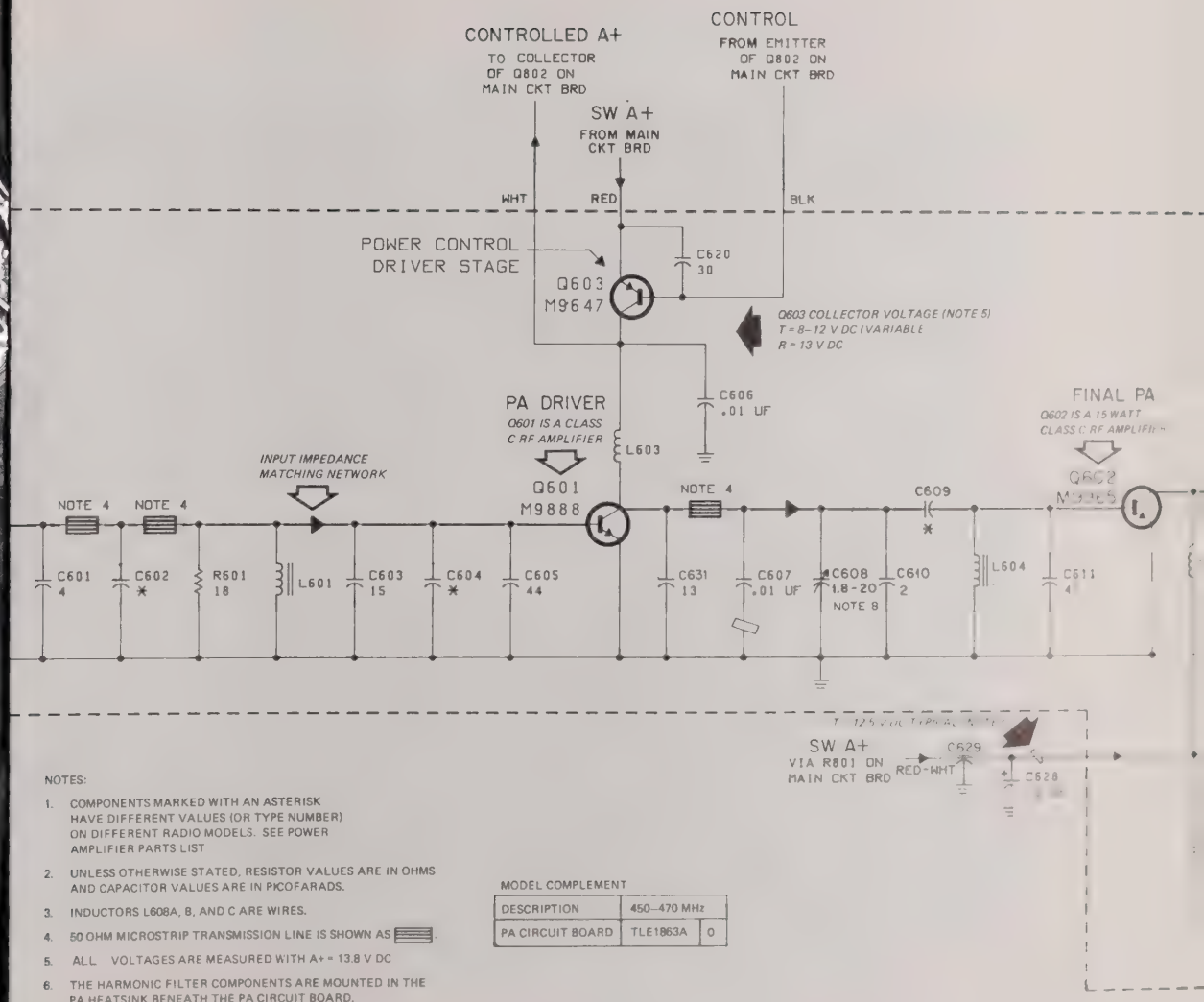
1. For optimum perfor grated circuits mus
2. C605 and Q601 shou PK817. C611, C61 Order part kit RPX

DESCRIPTION
SCREW, tapping: 6-32 x 1/4"; 2 req'd.
SCREW, tapping: 6-32 x 5/16"; 7 req'd.
SCREW, tapping: 4-40 x 5/16"; 2 req'd.
SCREW, machine: 6-32 x 1-1/8"
WASHER, shoulder
INSULATOR, transistor (.520 x .660")
INSULATOR (1.07 x 1.82")
INSULATOR (2.19 x 1.82")
HEATSINK
FERRITE BEAD (.047 x .138 x .236")
RING, retaining

, diodes, transistors, and inte-
dered by Motorola part numbers.

eplaced together. Order part kit
Q602 should be replaced together.


RF INPUT
FROM
POWER TRIPLER
(50 OHMS)

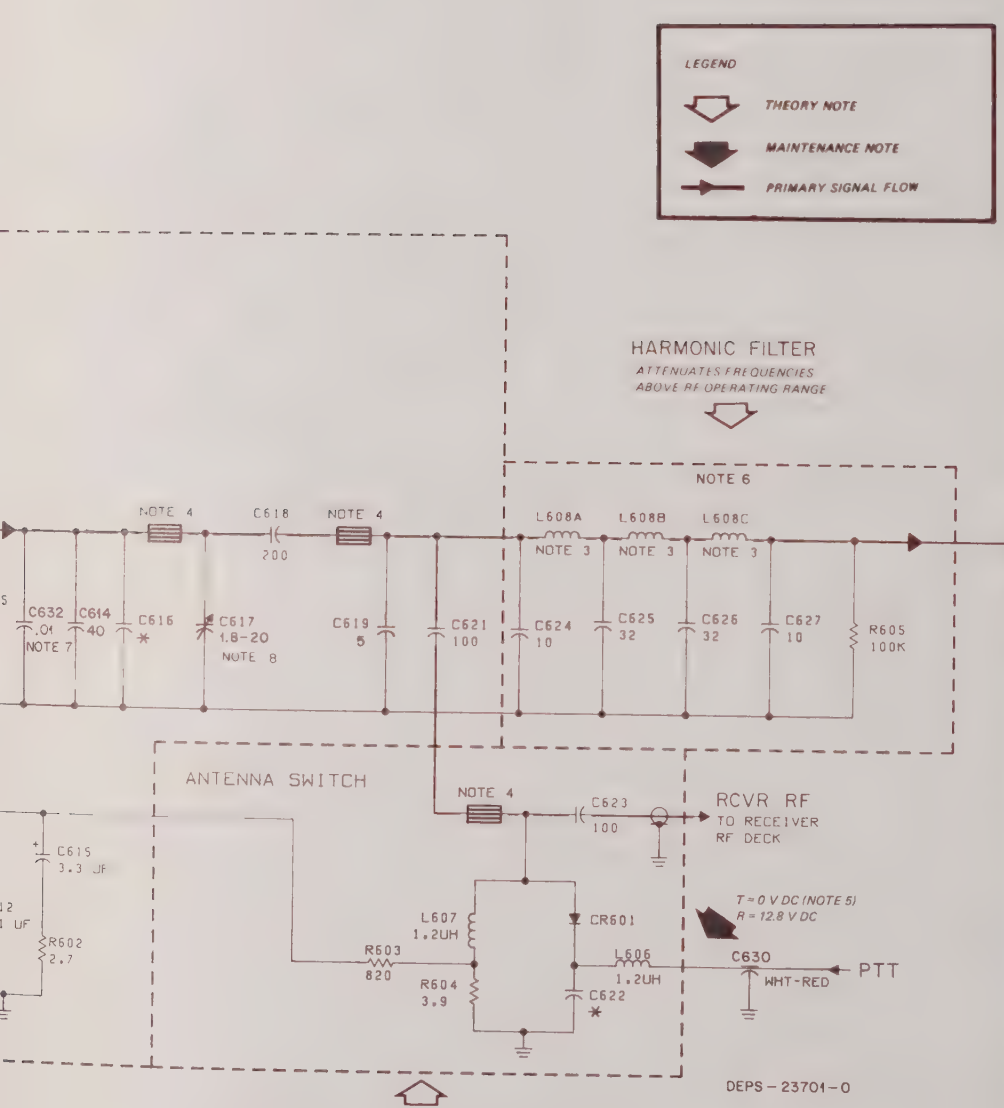


NOTES:

1. COMPONENTS MARKED WITH AN ASTERISK HAVE DIFFERENT VALUES (OR TYPE NUMBER) ON DIFFERENT RADIO MODELS. SEE POWER AMPLIFIER PARTS LIST
2. UNLESS OTHERWISE STATED, RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES ARE IN PICOFARADS.
3. INDUCTORS L608A, B, AND C ARE WIRES.
4. 50 OHM MICROSTRIP TRANSMISSION LINE IS SHOWN AS
5. ALL VOLTAGES ARE MEASURED WITH A+ = 13.8 V DC
6. THE HARMONIC FILTER COMPONENTS ARE MOUNTED IN THE PA HEATSINK BENEATH THE PA CIRCUIT BOARD.
7. THE LEAD LENGTH OF C632 IS CRITICAL WHEN REPLACING PART. TOTAL LEAD LENGTH SHOULD BE 3/8 INCHES LONG
8. C608 IS FACTORY TUNED FOR MAXIMUM POWER OUTPUT AT 470MHZ
   C617 IS FACTORY TUNED FOR MAXIMUM POWER OUTPUT AT 450MHZ

MODEL COMPLEMENT

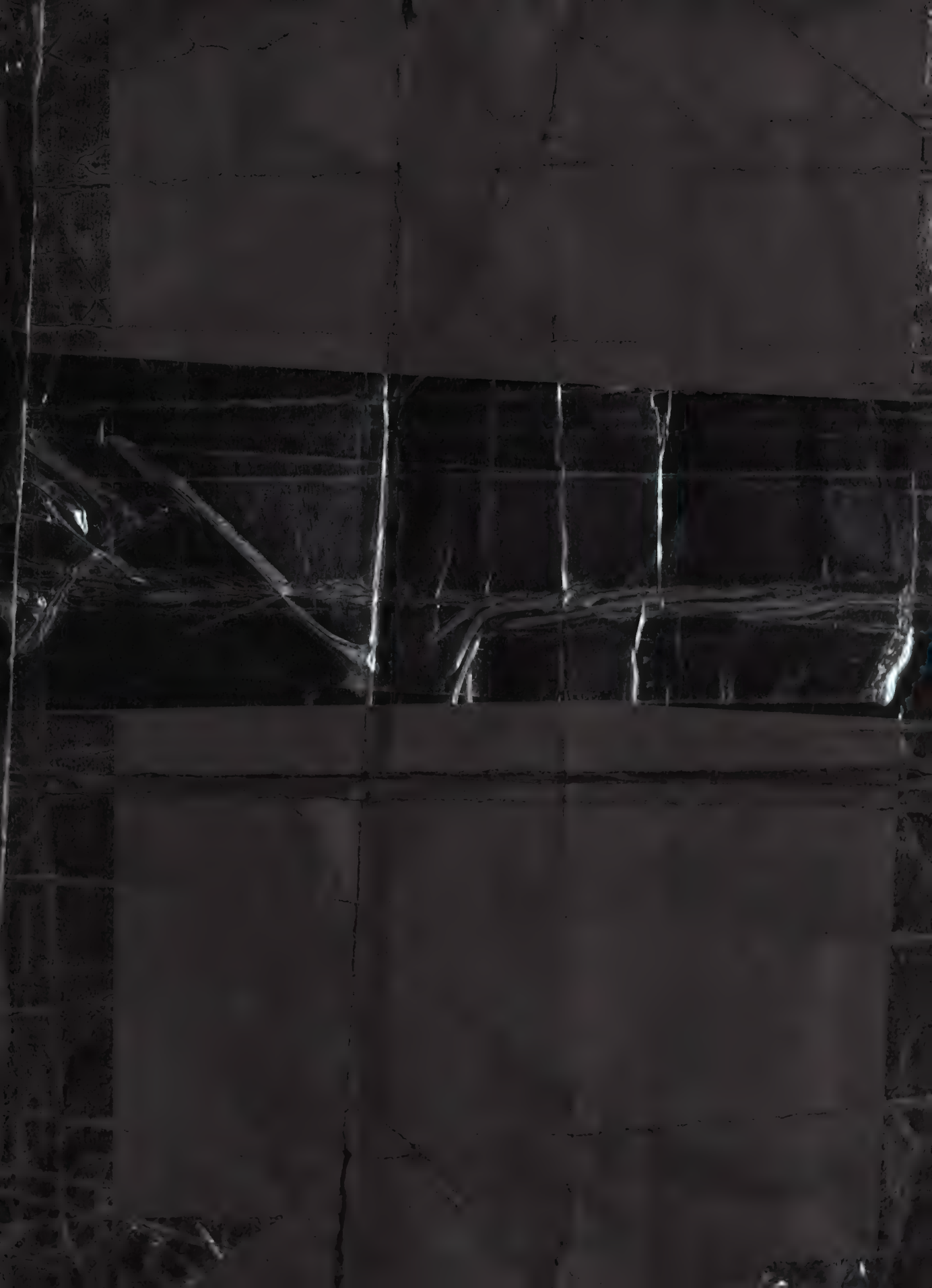
DESCRIPTION	450–470 MHz	
PA CIRCUIT BOARD	TLE1863A	0



ANTENNA SWITCH ISOLATES RCVR INPUT DURING TRANSMISSION
THE 50 OHM MICROSTRIP LINE IS A 1/4 WAVELENGTH SECTION

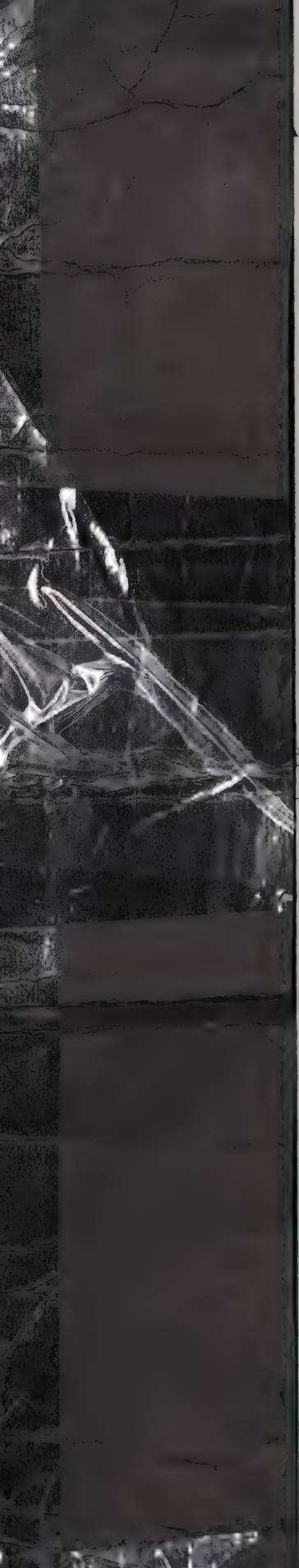
RECEIVE: PTT UNGROUNDED. CR601 NON–CONDUCTING (OPEN CIRCUIT). 1/4 WAVE LINE Z = 50 OHMS. PA OUTPUT CIRCUIT IS HIGH IMPEDANCE TO RECEIVED RF. RF PASSES TO RCVR RF INPUT

TRANSMIT PTT GROUNDED. CR601 CONDUCTS. SHORT AT 1/4 WAVE LINE OUTPUT CAUSES "OPEN" AT LINE INPUT. XMTR RF IS BLOCKED FROM RCVR RF INPUT



10-WATT RF POWER AMPLIFIER
RMONIC FILTER, AND ANTENNA SWITCH

MODEL TLE1863A



FUNCTION

Provides a filtered 10-watt frequency-modulated rf signal to the antenna; the antenna switch switches the antenna between the transmitter and the receiver.

PA,HARMONIC FILTER,ANTENNA SWITCH

68P81035E28-O
(Sheet 2 of 2)
5/25/77-NPC

TONE "PRIVATE-LINE" ENCODER/DECODER

MODEL TRN6904A

PARTS LIST

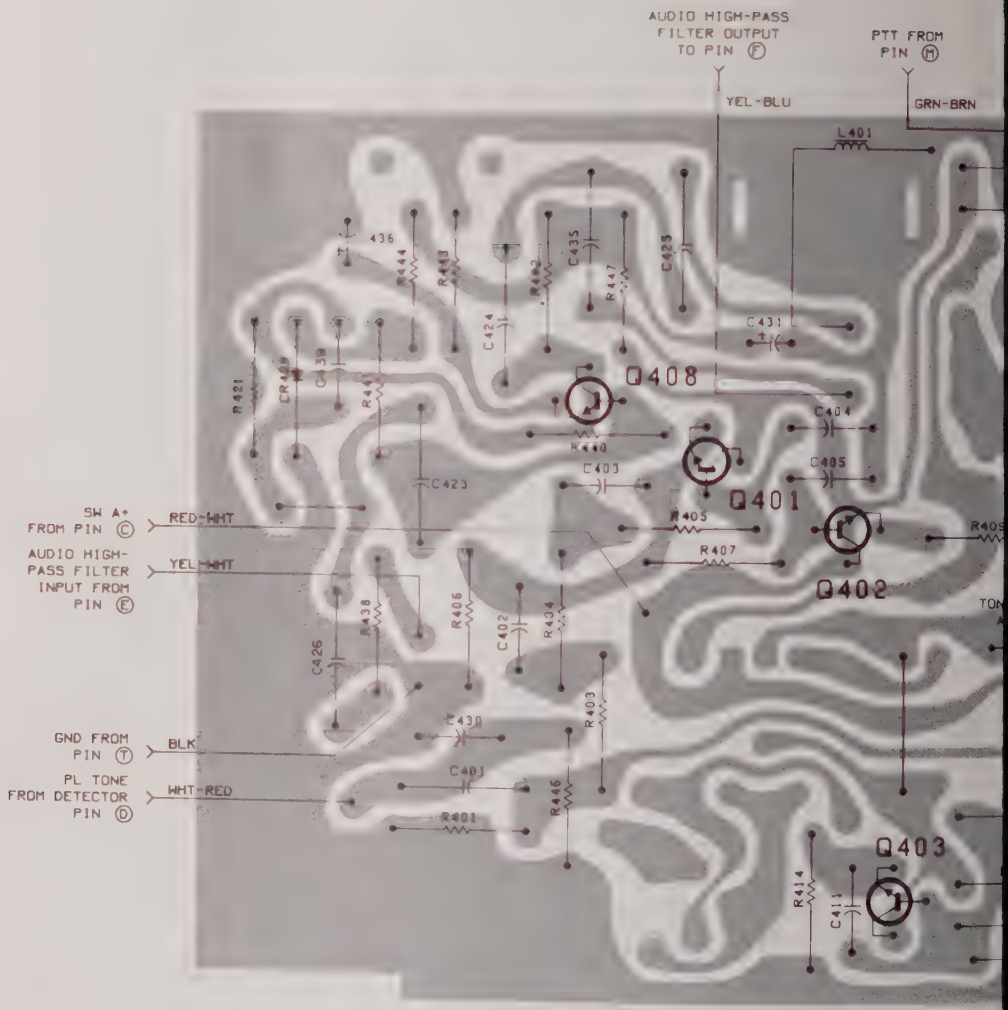
TRN6904A Tone-Coded "P
Encoder/Decoder

REFERENCE SYMBOL	MOTOROLA PART NO.
C401	21-82372C
C402, 403	21-82428
C404	21-82428
C405	21-82428
C406	21-83596
C407, 408	23-84665
C409	21-82428
C410	23-84665
C411	21-83596
C412, 413, 414	
C415	8-82096J
C416	
C417	23-84665
C418, 419	21-82428
C420	21-83596
C421	23-84665
C422	21-83596
C423, 424	8-84496D
C425	8-82905G
C426	8-84496D
C427	21-82372C
C428	23-84665
C429	
C430	21-82428
C431	23-84665
C432, 433	
C434	8-83813H
C435	8-84496D
C436	23-84665
C437	21-83596
C438	
C439	21-82428
C440	23-84665
CR401	
CR402	48-83654
CR403	
CR404	48-82178
CR405	48-83654
CR406	
CR407, 408, 409	48-83654
L401	25-82498
Q401, 402	48-13466
Q403 thru 406	48-86964
Q407	48-86964
Q408	48-13466
Q409	48-86964
R401, 402	6-124D02
R403, 404, 405	6-124A99
R406	6-124D02
R407	6-124A99
R408	6-124C49
R409	6-124C69
R410	6-124C63
R411	6-124A99
R412	6-124C85
R413	6-124C55
R414	6-124C37
R415	
R416	6-124C65
R417 thru 420	
R421	6-124C87
R422 thru 427	
R428	6-124C49
R429	6-124C83
R430	6-124C33
R431	6-124C61
R432	6-124C57

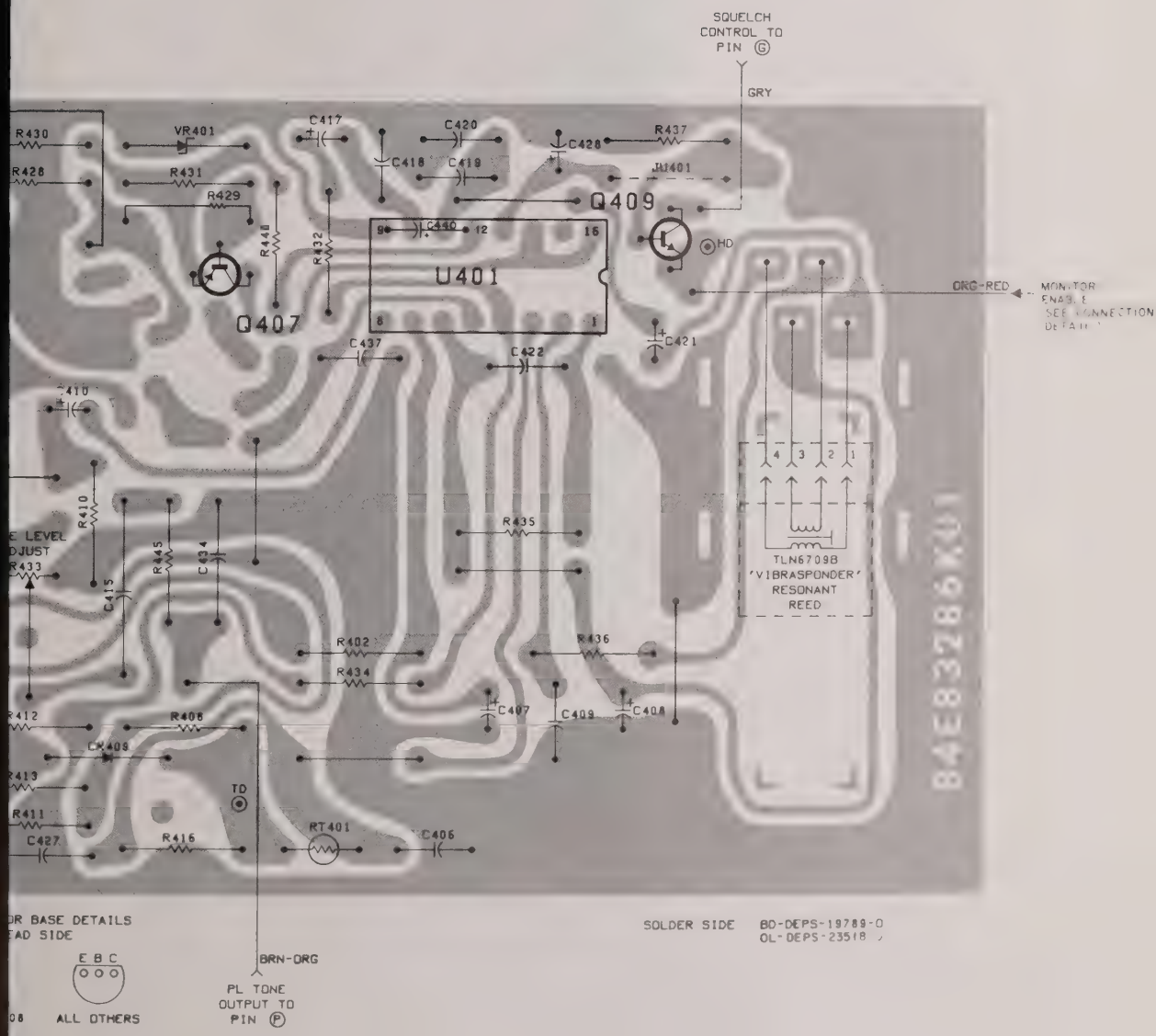
	DESCRIPTION
	rivate-Line" PL-5334-O
	CAPACITOR, fixed: uF ±10%; 100 V; unless otherwise stated
C01	0.1 +80-20%; 25 V
B59	.01 +80-20%; 200 V
B23	.0012
B59	.01 +80-20%; 200 V
E10	220 pF ±20%; 500 V
F01	10 +100-0%; 25 V
B09	.0047
F01	10 +100-0%; 25 V
E10	220 pF ±20%; 500 V
	NOT USED
0	0.22
	NOT USED
F04	1 +150-0%; 50 V
B09	.0047
E10	220 pF ±20%; 500 V
F01	10 +100-0%; 25 V
E10	220 pF ±20%; 500 V
04	.047 ±20%; 100 V
31	0.15; 50 V
04	.047 ±20%; 100 V
C01	0.1 +80-20%; 25 V
F01	10 +100-0%; 25 V
	NOT USED
B59	.01 +80-20%; 200 V
F04	1 +150-0%; 50 V
	NOT USED
01	.0068
04	.047 ±20%; 100 V
F01	10 +100-0%; 25 V
E10	220 pF ±20%; 500 V
	NOT USED
B28	.002
F04	1 +150-0%; 50 V
	DIODE: (SEE NOTE)
	NOT USED
H01	silicon
	NOT USED
A06	germanium
H01	silicon
	NOT USED
H01	silicon
	COIL:
H02	6 H
	TRANSISTOR: (SEE NOTE)
7	NPN; type M54
2	NPN; type M9642
8	PNP; type M9643
7	NPN; type M54
2	NPN; type M9642
	RESISTOR, fixed: ±10%; 1/4 W; unless otherwise stated
	150k
	120k ±5%
	150k
	120k ±5%
	1k
	6.8k
	3.9k
	120k ±5%
	33k
	1.8k
	330
	NOT USED
	4.7k
	NOT USED
	22k
	NOT USED
	1k
	27k
	220
	3.3k
	2.2k

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R433	18-84944C02	variable: 25k
R434	6-124C53	1.5k
R435	6-124C87	22k
R436	6-124C45	680
R437	6-124C97	100k
R438	6-124C73	10k
R439		NOT USED
R440	6-124D02	150k
R441	6-124C89	47k
R442	6-124C97	100k
R443, 444	6-124C73	10k
R445	6-124C77	15k
R446	6-124C85	33k
R447	6-124C49	1k
R448	6-124C97	100k
R449		NOT USED
		THERMISTOR
RT401	6-82990E18	190 ohms
		INTEGRATED CIRCUIT: (SEE NOTE)
U401	51-84267A04	type 67A04
		DIODE (SEE NOTE)
VR401	48-82256C25	Zener type: 12 V
NON-REFERENCED ITEMS		
	TLN6709B	VIBRASPONDER, resonant reed
	42-84116B02	SOCKET, Vibrasponder
	39-10184A10	CONTACT, push-pin, male
	39-10184A24	CONTACT, push-pin, female
	29-84706E06	PIN, female, molex

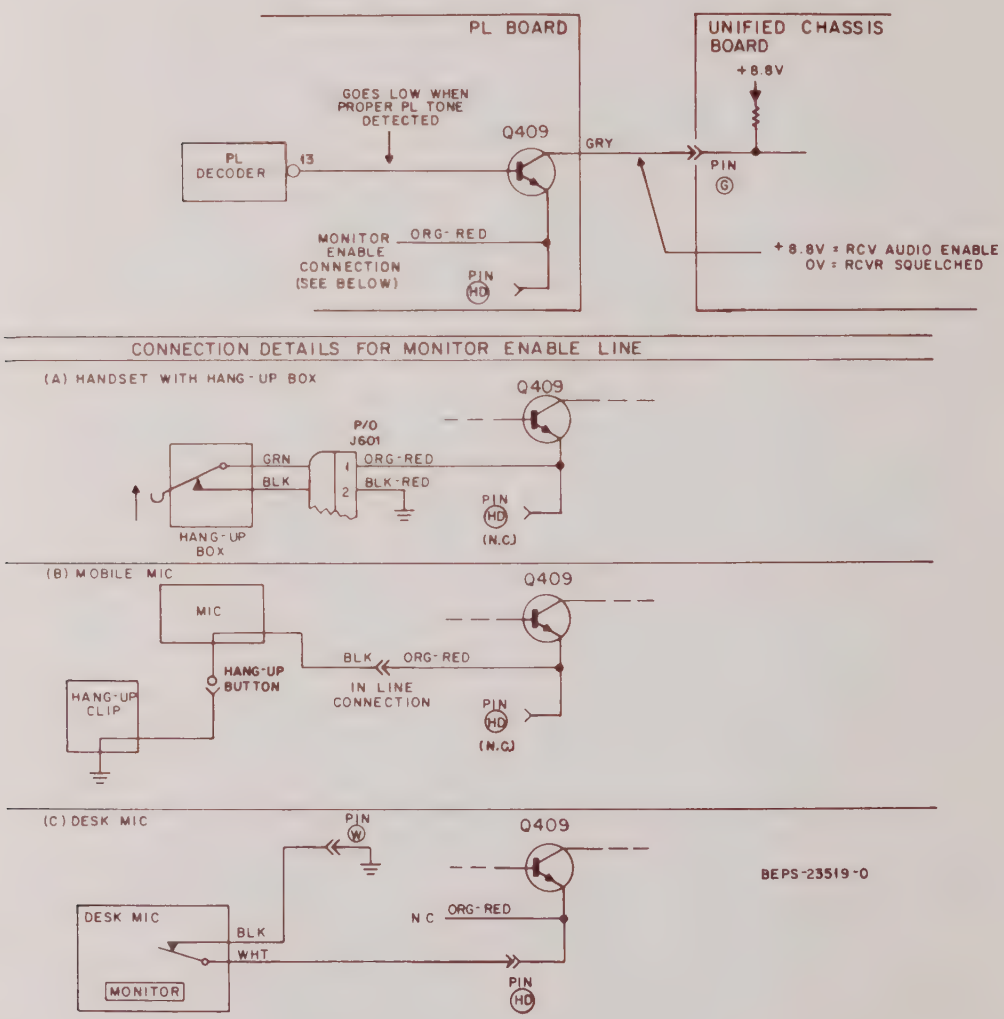
NOTE: For optimum performance, replacement diodes, transistors, and integrated circuits must be ordered by Motorola part number.



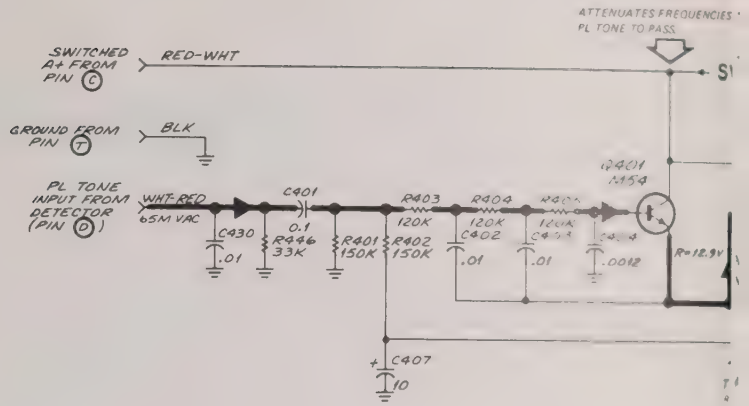
SHOWN FROM SOLDER SIDE

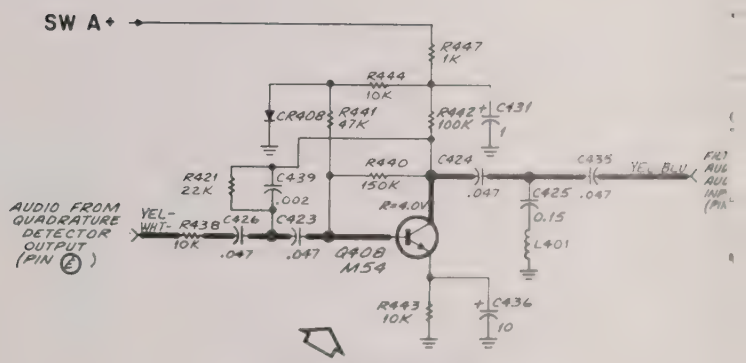

SQUELCH
CONTROL TO
PIN G
GRY
R430
R428
VR401
R431
R429
C417
C420
C418
C419
C428
R437
JU401
Q409
HD
R440
R432
C440
U401
Q407
ORG-RED
MONITOR
ENABLE
SEE CONNECTION
DETAIL
C437
C422
C421
C410
R410
E LEVEL
DJUST
R433
C415
R445
C434
R435
TLN6709B
'VIBRASPONDER'
RESONANT
REED
R402
R434
R436
C407
C409
C408
R412
R408
CR409
R413
TD
R411
C427
R416
RT401
C406
84E83286K01
OR BASE DETAILS
EAD SIDE
E B C
ALL OTHERS
BRN-ORG
PL TONE
OUTPUT TO
PIN P
SOLDER SIDE
BD-DEPS-19789-0
OL-DEPS-23518

MONITOR ENABLE CONNECTION DETAIL



LOW PASS ACTIVE FI



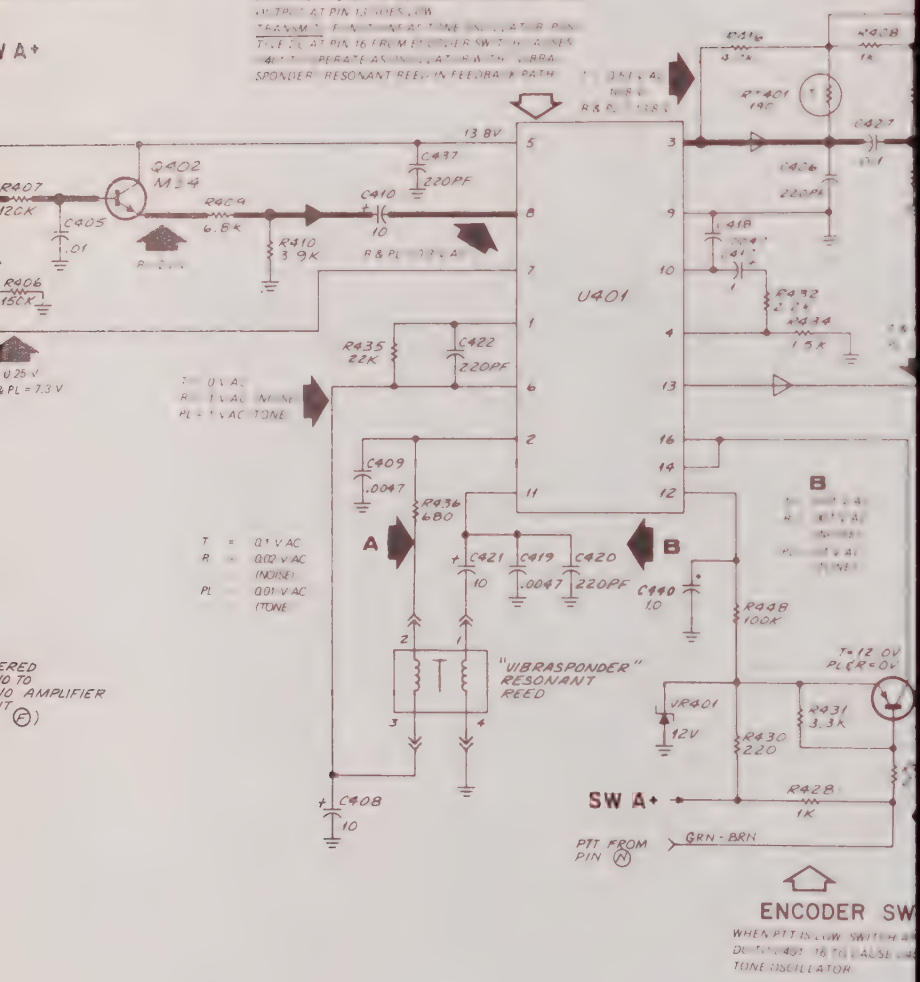


HIGH-PASS FILTER

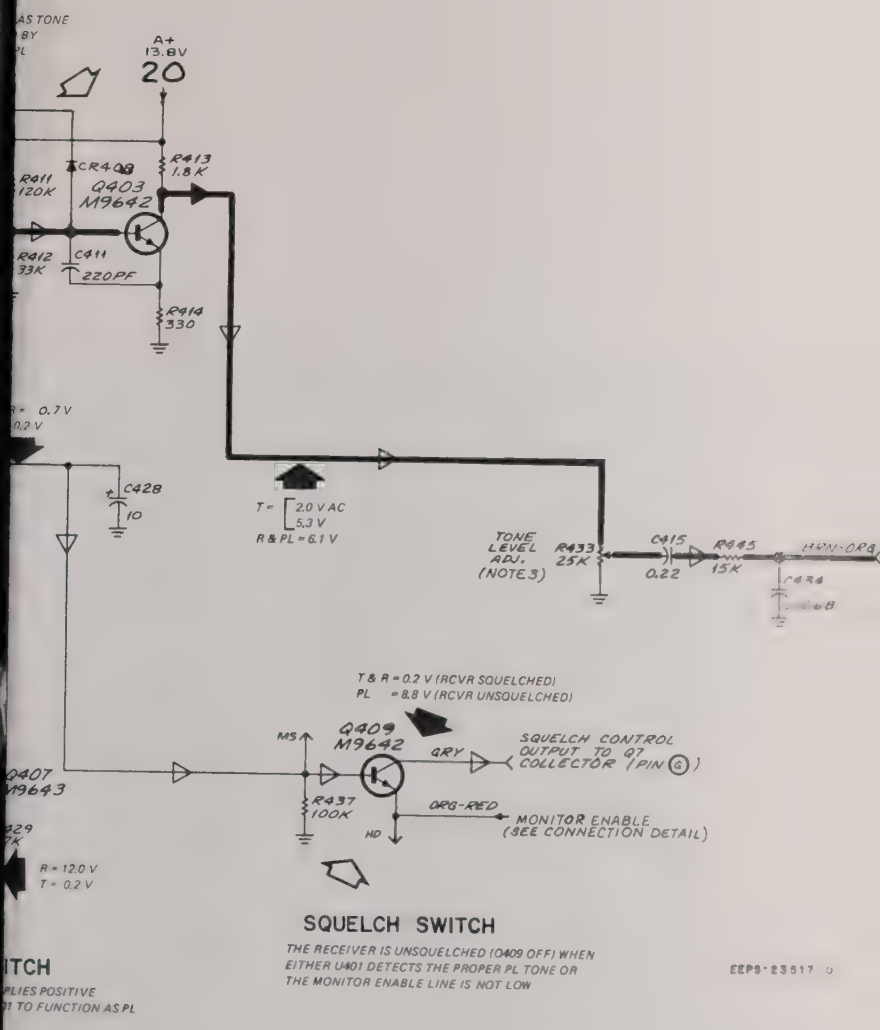
PASSES AUDIO FREQUENCIES ABOVE 300 Hz. PREVENTS PL TONE FROM BEING HEARD IN RCVR AUDIO

TONE AMPLIFIER

TONE DETECTOR/OSCILLATOR



ENCODER SW



SQUELCH SWITCH

THE RECEIVER IS UNSQUELCHED (Q409 OFF) WHEN EITHER U401 DETECTS THE PROPER PL TONE OR THE MONITOR ENABLE LINE IS NOT LOW

EEPS-23617-0

TONE "PRIVATE-LINE" ENCODER/DECODER

MODEL TRN6904A

FUNCTION

Encodes and decodes sub-audible "Private-Line" tones. Encoder modulates transmitter. Decoder detects received tone and unsquelches receiver when proper tone is received.

TONE OUTPUT TO MODULATOR PIN (2)

VERSION CHART

MODEL NO.	VERSION
TRN6904A	0

NOTES

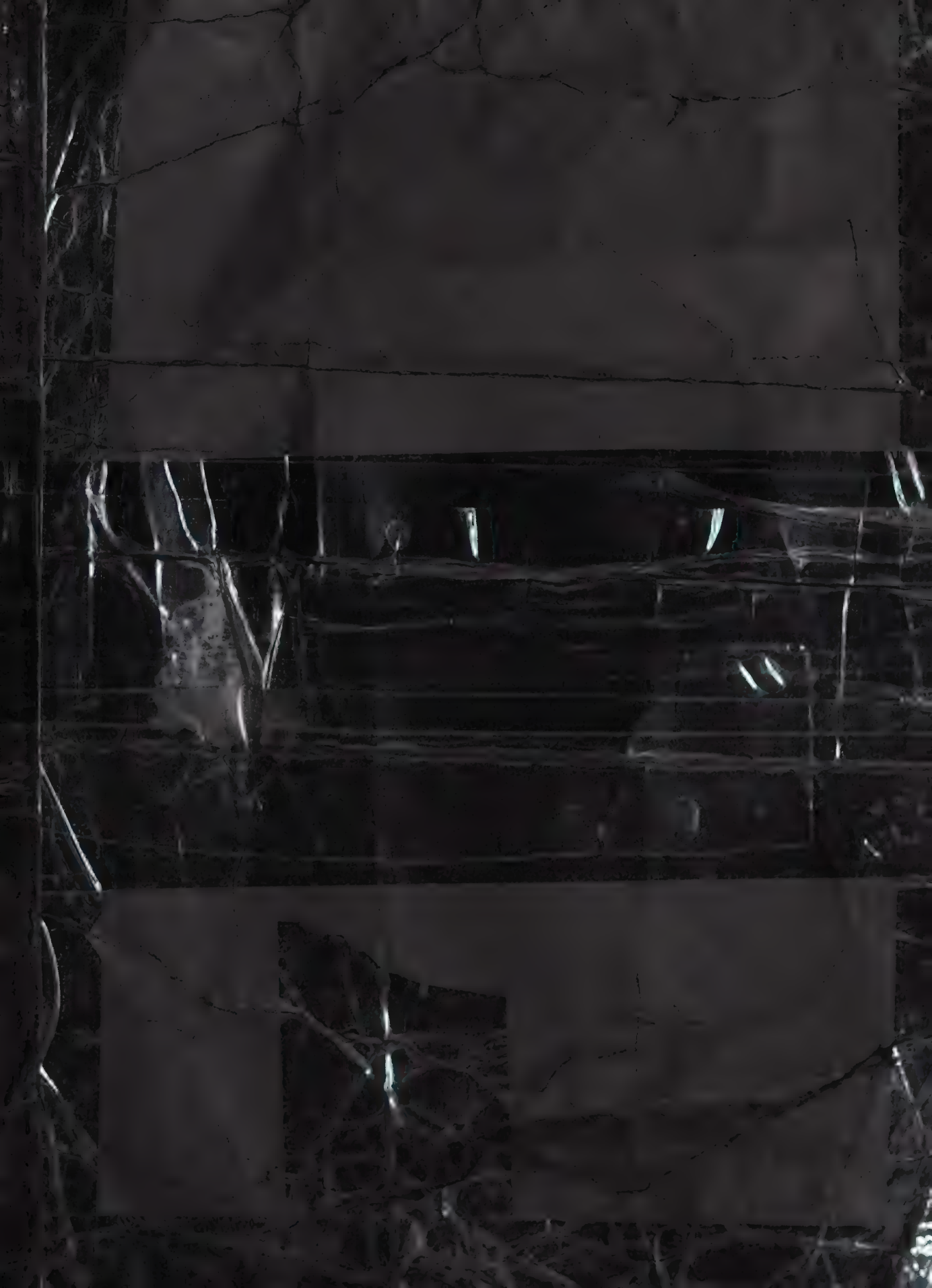
1. UNLESS OTHERWISE NOTED, RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES ARE IN MICROFARADS
2. VOLTAGE NOTATIONS ARE AS FOLLOWS

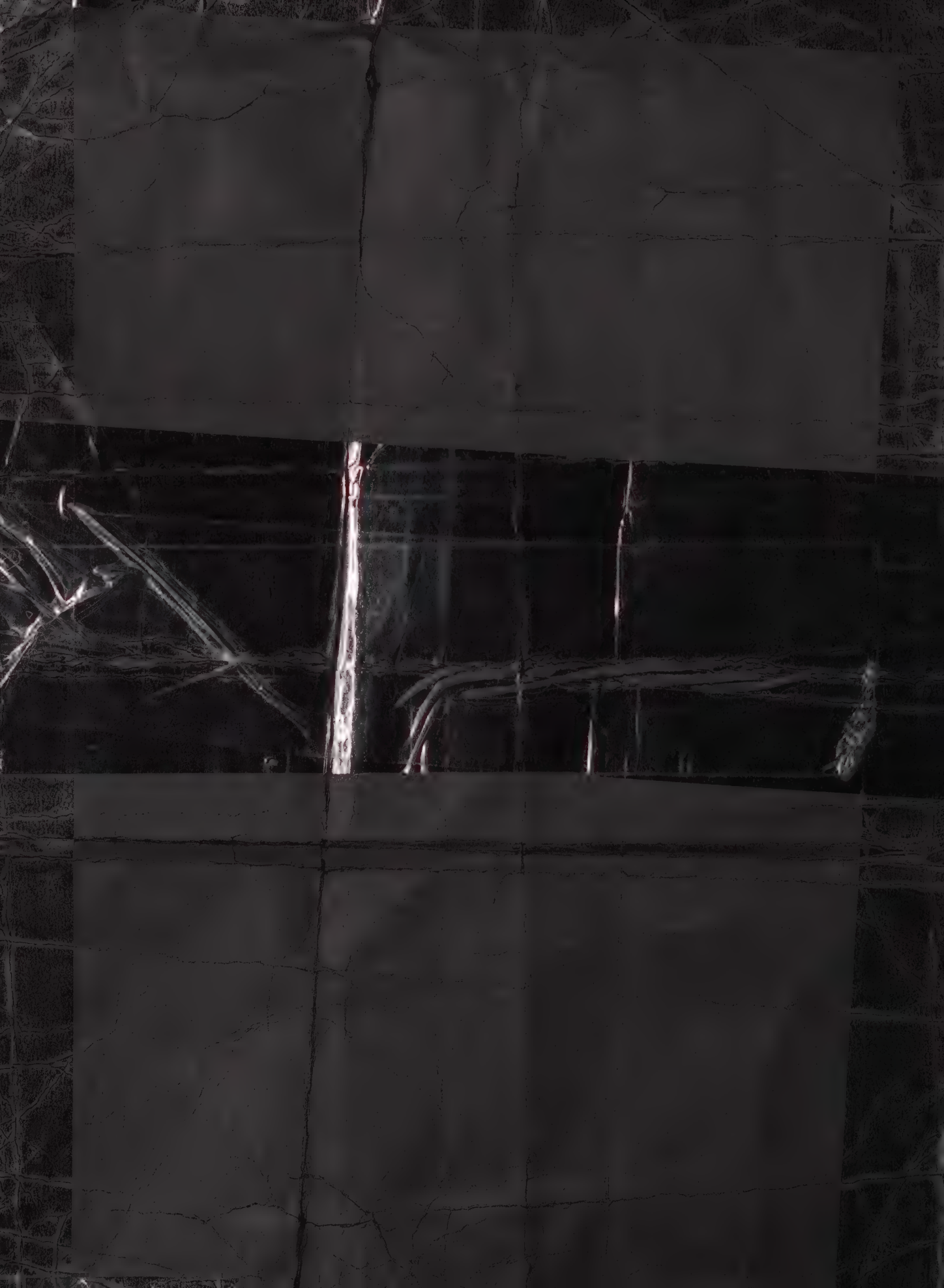
   T = TRANSMITTER KEYED
   R = RECEIVE, NO TONE PRESENT
   PL = RECEIVE, TONE PRESENT

   ALL DC VOLTAGES MEASURED WITH 20,000 OHM–PER–VOLTMETER UNLESS OTHERWISE NOTED. ALL AC VOLTAGES ARE RMS VALUES
3. DETAILED INSTRUCTIONS ON DEVIATION ADJUSTMENT ARE PROVIDED IN THE TRANSMITTER ALIGNMENT SECTION OF THIS MANUAL

LEGEND:

- = THEORY OF OPERATION DATA
- = MAINTENANCE DATA
- = RECEIVE SIGNAL
- = TRANSMIT SIGNAL
- = PTT CONTROL SIGNAL
- = SQUELCH CONTROL SIGNAL





"DIGITAL PRIVATE-LINE" ENCODER/DECODER

MODEL TRN6906A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION

PARTS LIST

TRN6906A "Digital Private-Line" Encoder/Decoder

P[illegible]-5335-O

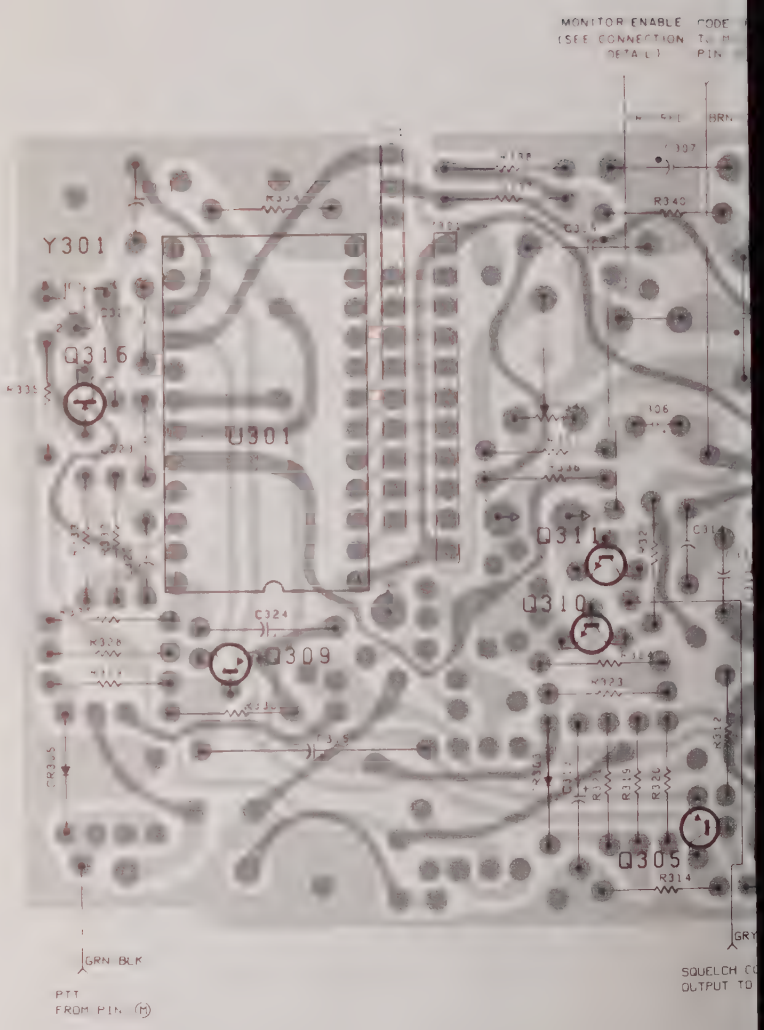
		CAPACITOR, fixed: [illegible] ±5%; 50 V; unless otherwise stated
C301	23-84665F02	15 +100-0%: 35 V
C302	8-82905G39	.023
C303	8-83813H23	.068
C304	8-83813H19	.0039
C305	23-84665F01	10 +100-0%: 35 V
C306	23-84665F02	15 +100-0%: 35 V
C307	8-83813H27	.0033
C308	8-83813H24	.036
C309	8-83813H14	.043
C310	23-82783B48	0.68: 35 V
C311, 312	21-82187B20	.001 ±10%; 100 V
C313	23-84762H07	4.7 ±20%: 10 V
C314	21-82428B59	.01 +80-20%: 200 V
C315	23-82783B27	10 ±10%: 25 V
C316		NOT USED
C317, 318	21-82428B59	.01 +80-20%: 200 V
C319	23-84665F02	15 +100-0%: 35 V
C320	21-82428B59	.01 +80-20%: 200 V
C321	21-83798B01	100 pF; 200 V
C322	21-840849	20 pF; 500 V
C323	21-82428B09	.0047 ±10%; 100 V
C324	23-82783B08	1 ±20%: 35 V
C325	21-82187B20	.001 ±10%; 100 V
C326, 327		NOT USED
C328	21-82187B20	.001 ±10%: 100 V
C329	8-83813H26	.0056
C330	8-82905G32	0.22 ±10%: 50 V
C331	21-82428B59	.01 +80-20%: 200 V
C332	8-83813H26	.0056
C333 thru 342		NOT USED
C343	21-82877B24	220 pF
C344, 345	21-83596E10	220 pF ±10%; 500 V
C346	21-82877B24	220 pF
		DIODE: (SEE NOTE I)
CR301, 302	48-84616A01	hot carrier
CR303	48-83654H01	silicon
CR304, 306		NOT USED
CR305, 307	48-83654H01	silicon
CR308 thru 310		NOT USED
CR311	48-83654H01	silicon
		SOCKET:
J301	9-82071K01	female; 12 contact

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIP[illegible]
		[illegible]
Q301	48-869643	PNP [illegible]
Q302, 303	48-869642	NPN [illegible]
Q304, 305	48-869643	PNP [illegible]
Q306	48-869642	NPN [illegible]
Q307, 309	48-869643	PNP [illegible]
Q308		NOT [illegible]
Q310, 311	48-869642	NPN [illegible]
Q312 thru 314		NOT [illegible]
Q315	48-869642	NPN [illegible]
Q316	48-869653	field [illegible]
Q317	48-869648	NPN [illegible]
		RESISTOR: fixed [illegible]
R301		NOT [illegible]
R302	6-124A95	82k
R303	6-124A90	51k
R304	6-124A56	2.0
R305		fla[illegible]
R306, 307, 308	6-13755D64	56.2k ±1%
R309	6-124A55	1.8
R310, 311	6-124A73	10k
R312	6-124C59	2.7k ±1%
R313	6-124C73	10k ±1%
R314	6-124C83	27k ±1%
R315	6-13755D80	5[illegible]
R316	6-124B14	47k
R317	6-124A75	1.5
R318	6-124A89	47
R319	6-124A99	120
R320, 321	6-124C95	82k ±1%
R322	6-124C89	47k ±1%
R323	6-124A99	120
R324	6-124C95	82k ±1%
R325, 326, 327		NOT USED
R328	6-124C73	10k ±1%
R329	6-124A81	2.2
R330	6-124A83	27k
R331	6-124C97	100k ±1%
R332	6-124B14	47k
R333	6-124B04	1.8k
R334	6-124A77	1.2k
R335	6-124B14	47k
R336	6-124A91	560
R337	6-124A97	100
R338	6-124A99	120
R339		NOT [illegible]
R340, 341	6-124A97	100
R342	18-84944C01	var
R343	6-124C33	22 ±1%
R344	6-124C37	330 ±1%
R345, 346		NOT [illegible]
R347	6-124B12	39k
R348 thru 350		NOT [illegible]
R351, 352	6-124C81	22k ±1%
		[illegible]
U301	51-84267A82	type
U302	51-84320A55	type
U303	51-84320A79	type
		[illegible]
Z301	51-82142K02	resistive
		CRYSTAL: [illegible]
Y301	48-82003K01	resonat[illegible]
		VOLTAGE REG[illegible]
VR301	48-82256C34	Zener [illegible]
VR302	48-83696E07	Zener [illegible]

NOTES:

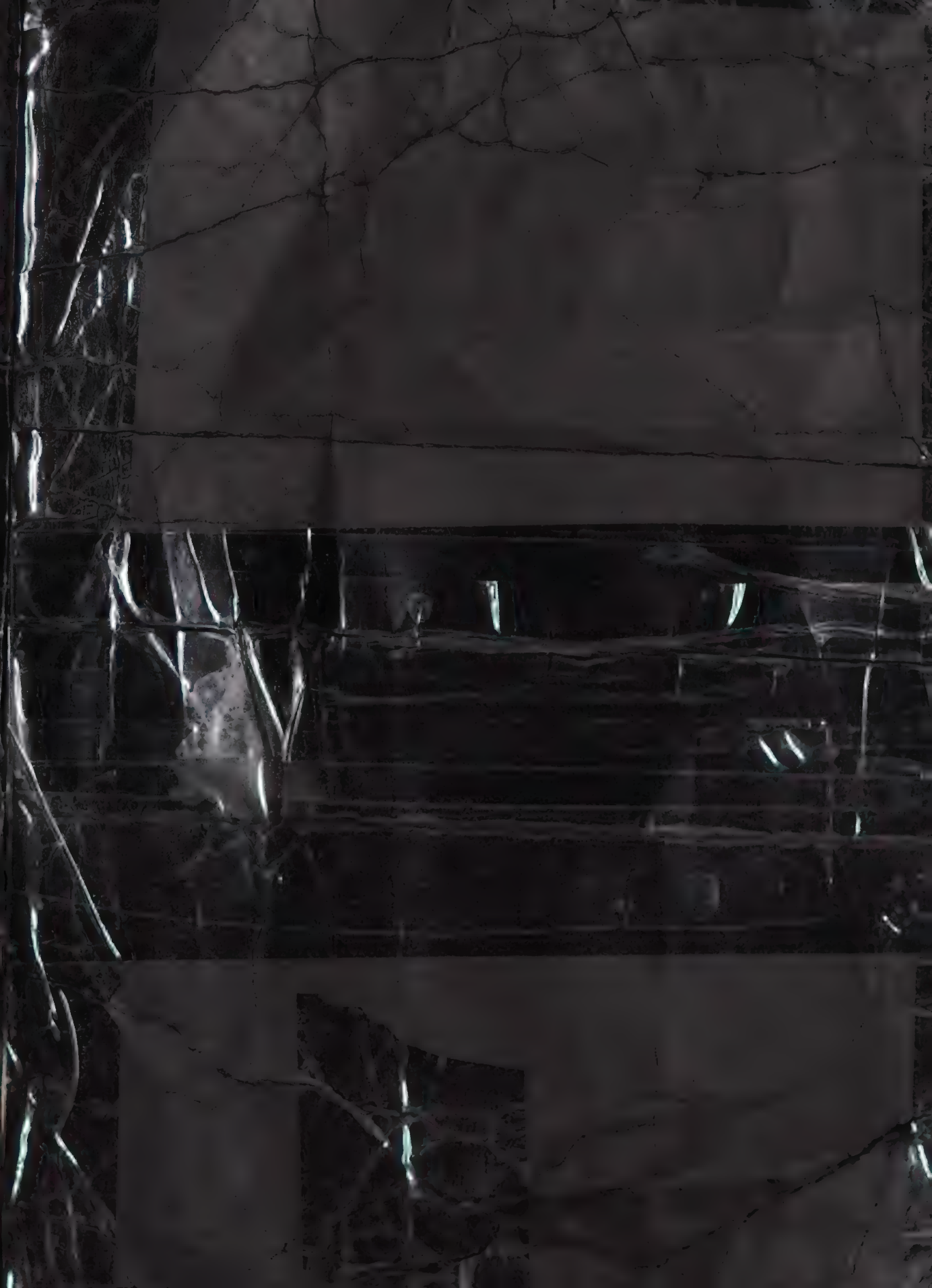
I. Replacement diodes, transistors, [illegible] must be ordered by Motorola part [illegible] performance.

II. When ordering crystal units, [illegible] crystal frequency and crystal type [illegible]

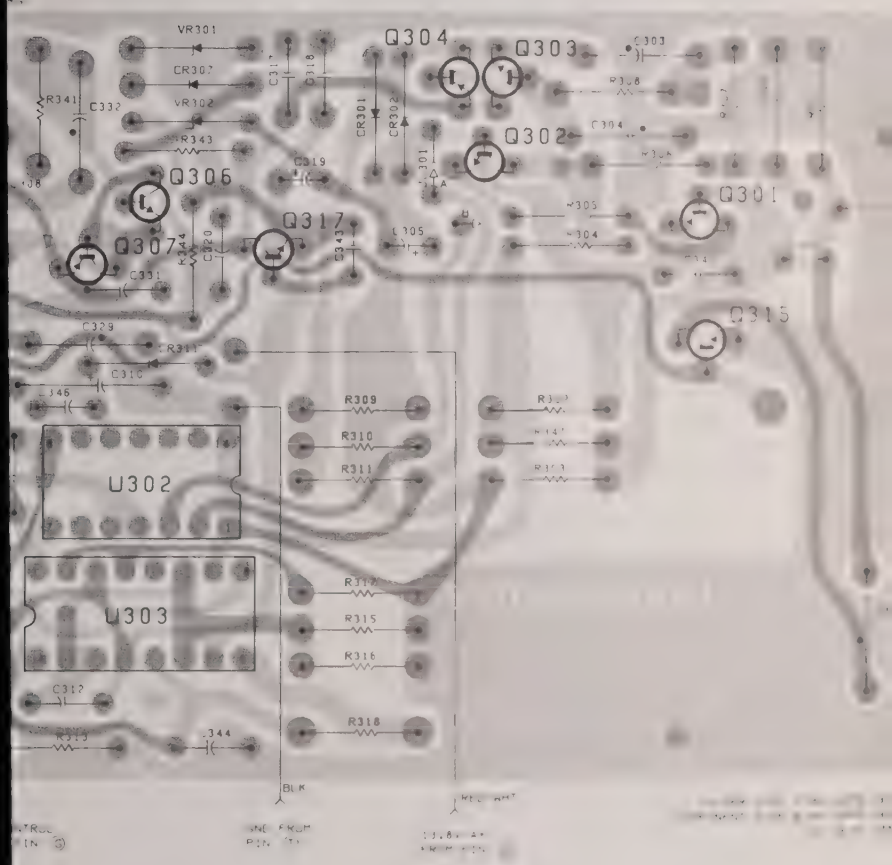


NOTES

1. SOME MYLAR CAPACITORS ARE SHOWN WITH ONE PLATE MARKED WITH A DOT. THE DOT ON THE SYMBOL CORRESPONDS TO A DOT ON THE CAPACITOR BODY WHICH IDENTIFIES THE OUTER FOIL LEAD



SHOWN FROM SOLDER SIDE

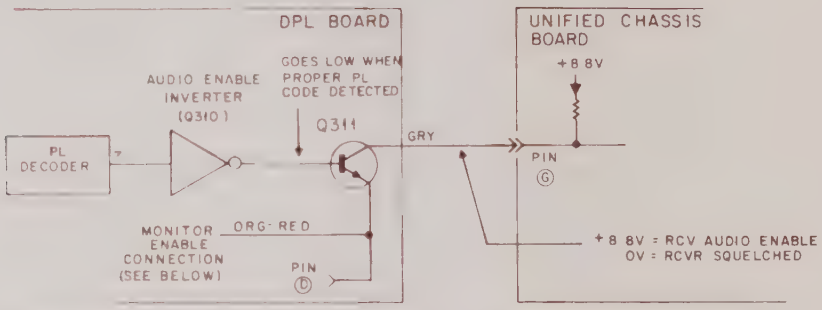


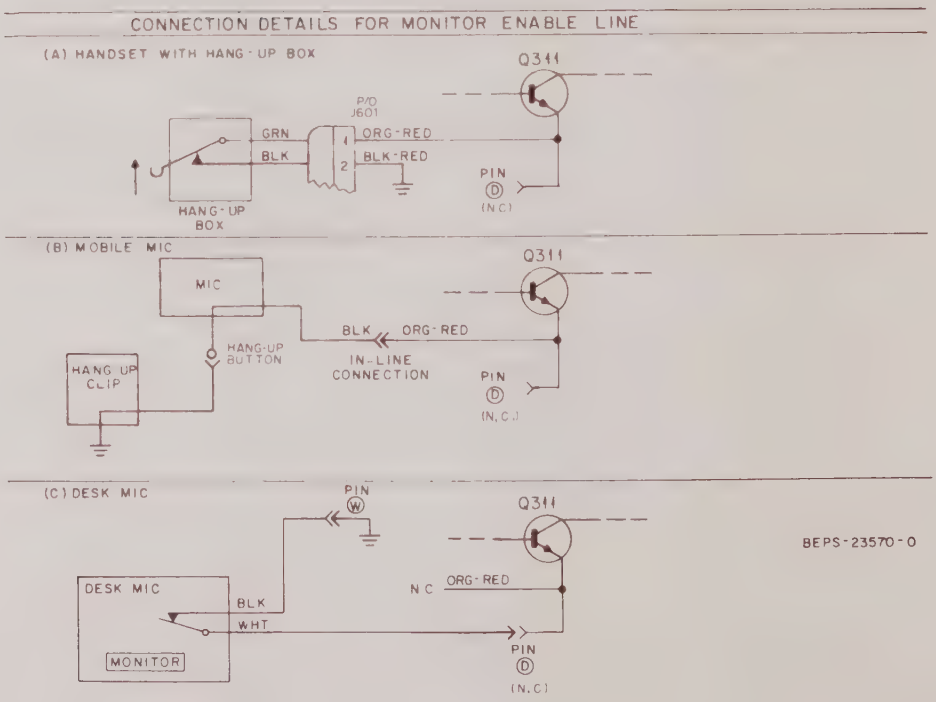
MONITOR ENABLE CONNECTION DETAIL

U301 DETAIL
(TOP VIEW)

DOT INDICATES
PIN 1 LOCATION

ED — CODE INPUT FROM
DETECTOR PIN (D)





TRANSISTOR BASE DETAILS
(LEAD SIDE)

ALL OTHER
TRANSISTORS

BEPS-23570-O

NOTES

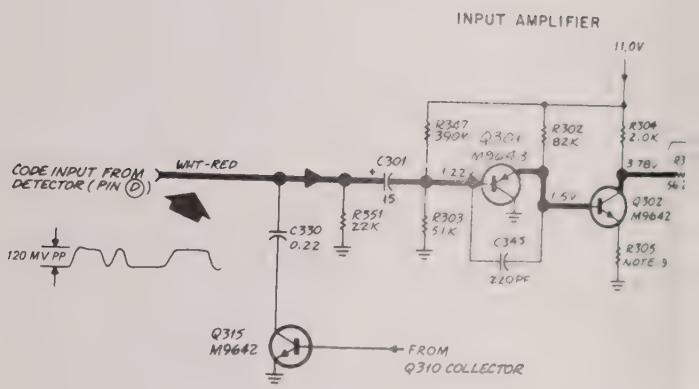
1. UNLESS OTHERWISE
   RESISTOR VALUES A
   CAPACITOR VALUES

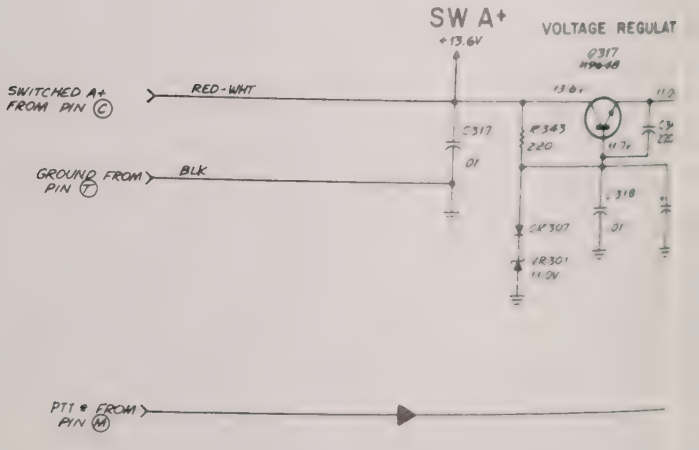
2. TRANSISTORS IN CU
   CIRCUIT ARE PART O

3. WAVEFORMS ARE T
   CHANNEL RF SIGNAL
   CONNECTOR, MODUL
   AND A DIGITALLY CO
   DEVIATION

4. DC VOLTAGES MEASU
   IMPEDANCE MULTIME
   IMPEDANCE), VOLTAC
   ARE FOR RECEIVE M

5. U301 IS A CMOS DEVI
   PRECAUTIONS ON TH





NDICATES
RE IN OHMS
ARE IN MICROFARADS.

RRENT SOURCE
FUNC SEE DETAIL A.

AKEN WITH AN ON
CP 1000 uV AT ANTENNA
ATED WITH 1000 Hz
ED SQUELCH SIGNAL AT +5 kHz

RED WITH A HIGH
TER 11 MEGOHM INPUT
ES IN PARENTHESES
ODE

F REFER TO THE HANDLING
E BACK OF THIS PAGE.

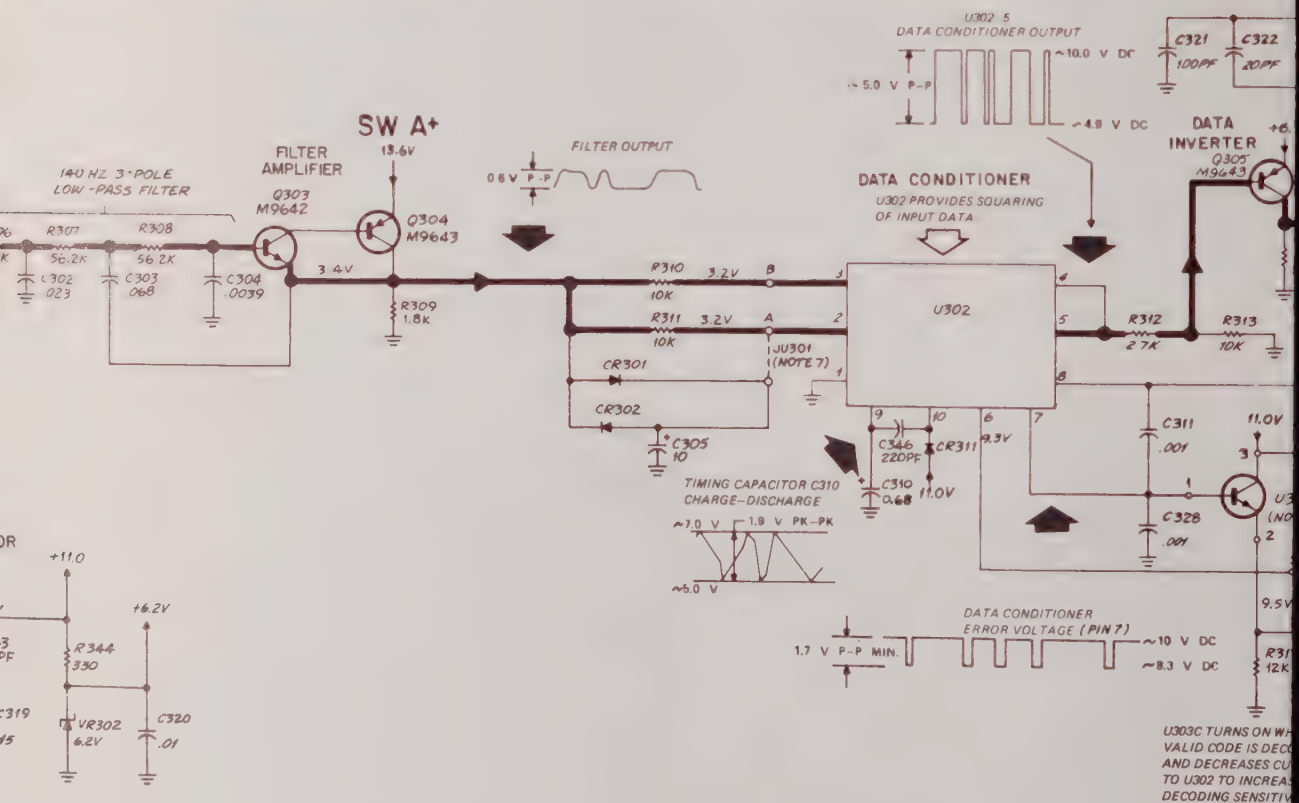
5. TO OBTAIN ACCURATE MEASUREMENT OF TRANSMITTER DEVIATION IN RADIOS EQUIPPED WITH "DIGITAL PRIVATE-LINE" BINARY-CODED SQUELCH, THE FREQUENCY RESPONSE OF THE DEVIATION MEASURING EQUIPMENT MUST BE < 1 Hz. DETAILED INSTRUCTIONS ON DEVIATION ADJUSTMENT ARE PROVIDED IN THE TRANSMITTER ALIGNMENT SECTION OF THIS MANUAL.

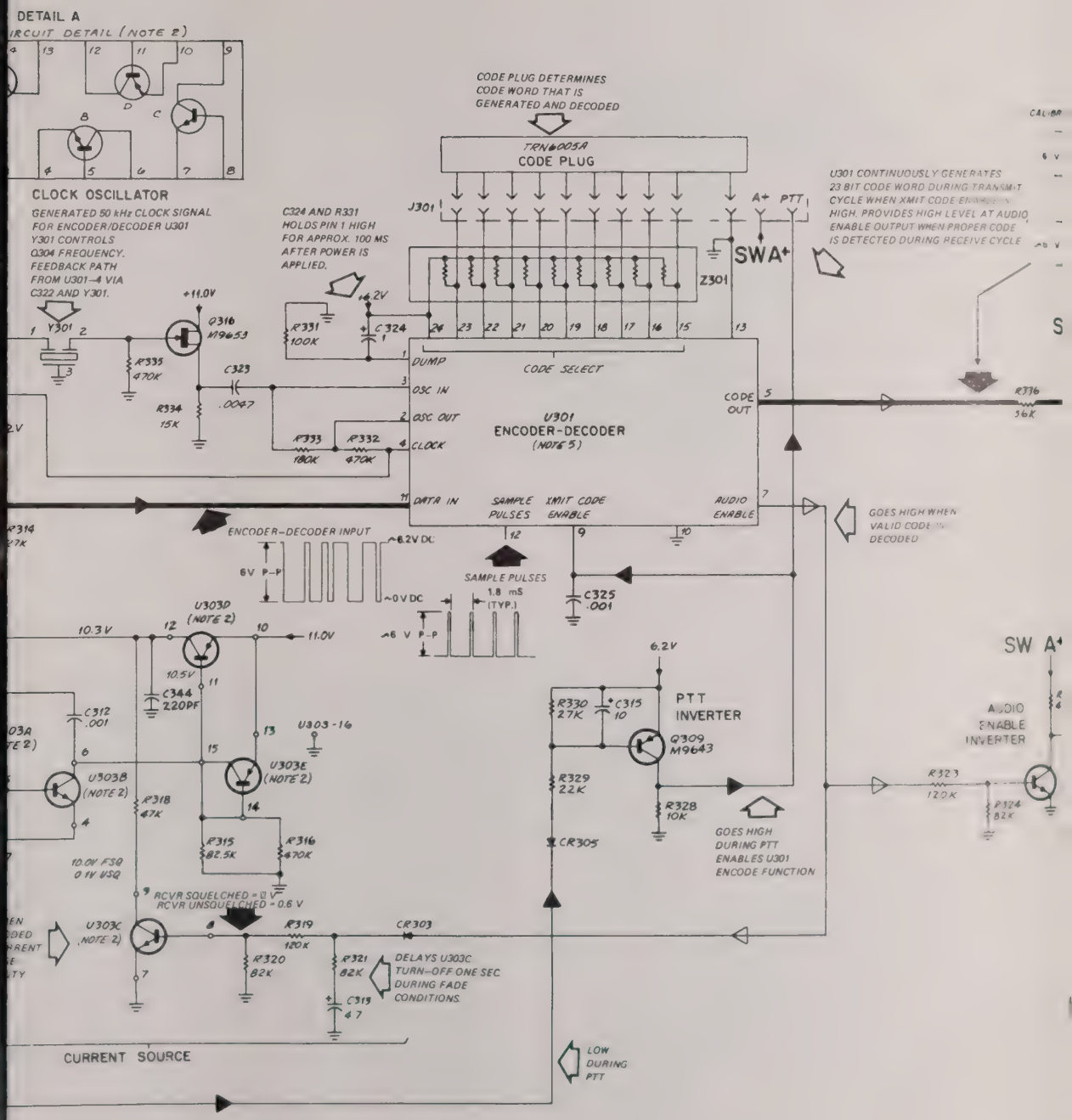
7. JU301 IS NORMALLY CONNECTED TO POINT A. CONNECT JU301 TO POINT B TO DECODE INVERTED CODES.

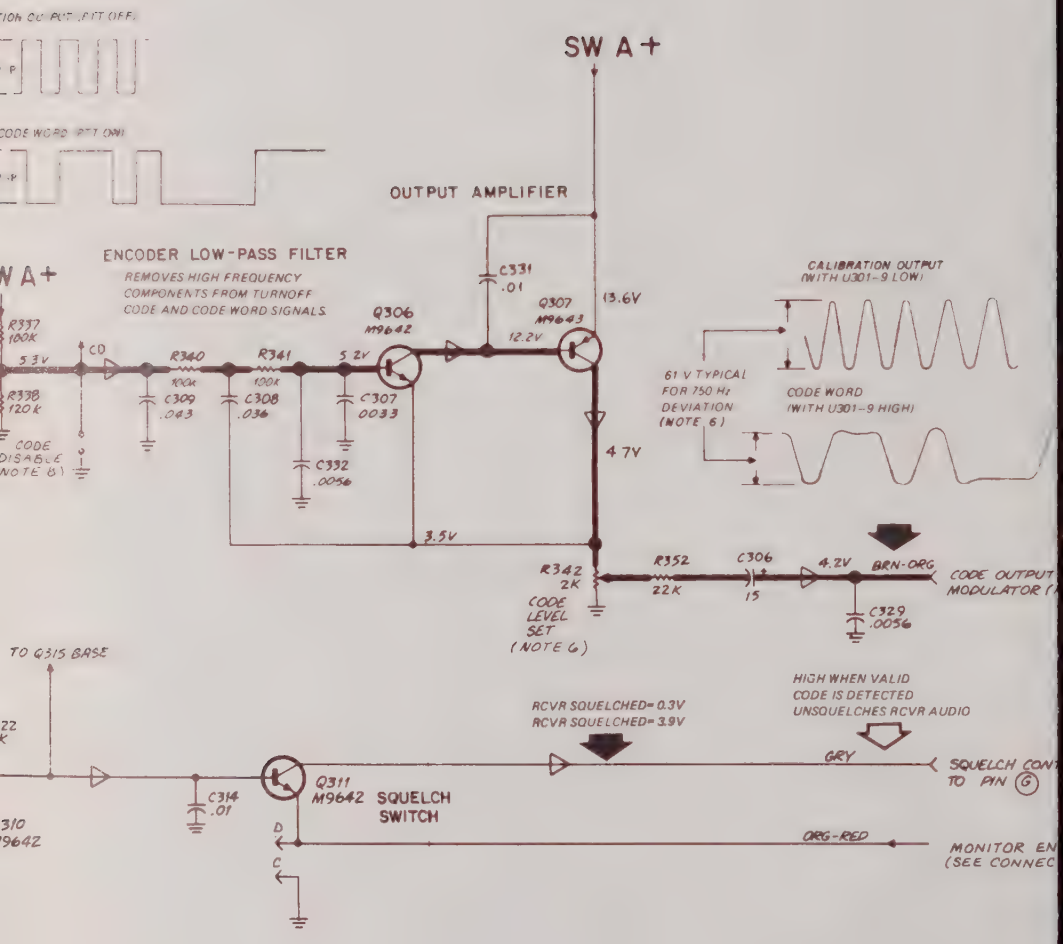
8. THE CODE DISABLE POINTS INDICATED ON THE SCHEMATIC DIAGRAM (U301 OUTPUT LINE) ARE CIRCUIT BOARD PLATING PADS. THESE PADS ARE SHORTED TOGETHER TO DISABLE THE DIGITAL PL CODE WHEN SETTING TRANSMITTER FREQUENCY AND AT TIMES WHEN SETTING MODULATION DEVIATION.

9. RESISTOR R305 FACTORY SELECTED.

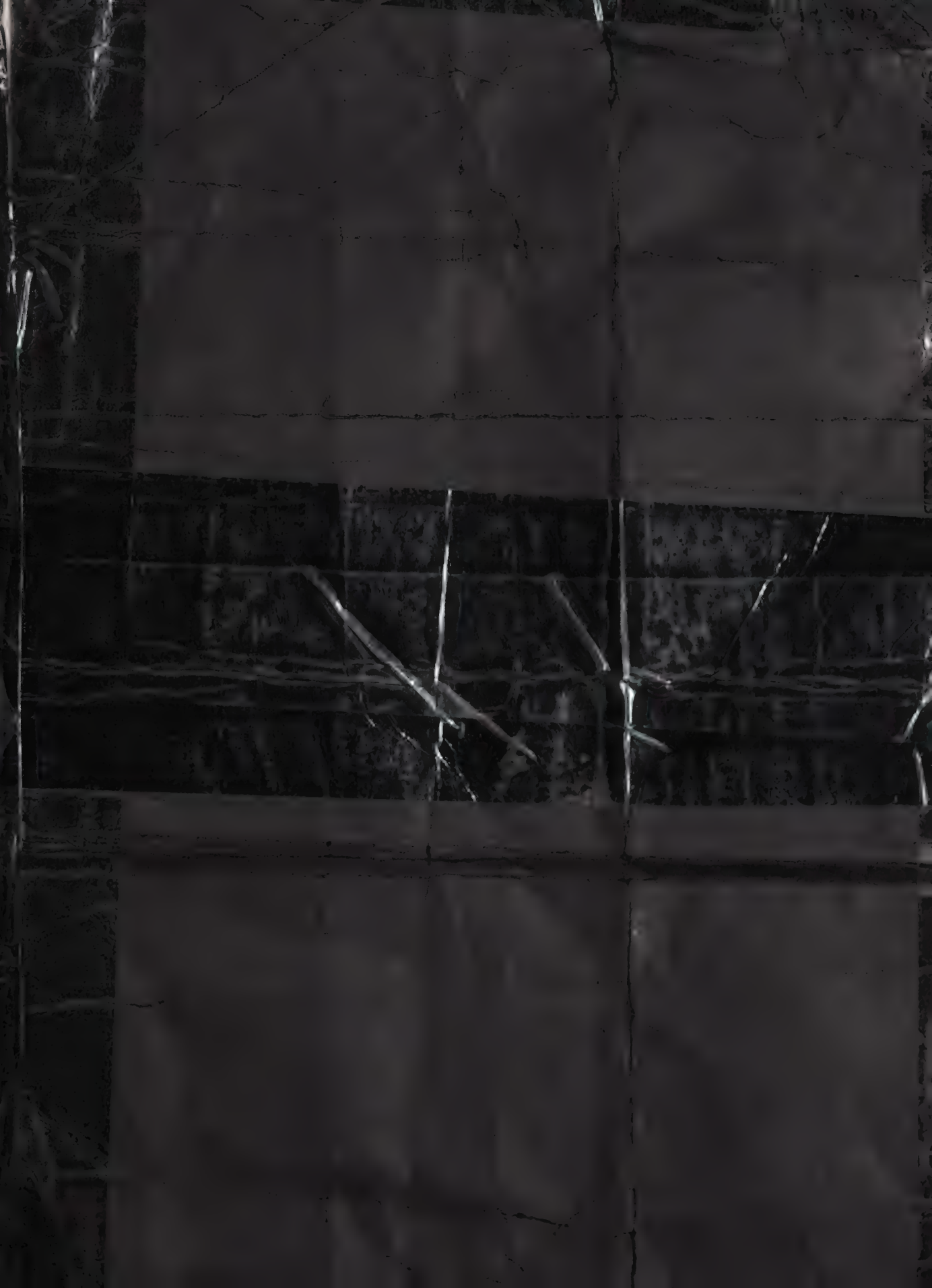
LEGEND
- THEORY OF OPERATION DATA
- MAINTENANCE DATA
- RECEIVED CODE SIGNAL
- TRANSMIT CODE SIGNAL
- PTT CONTROL
- AUDIO ENABLE CONTROL

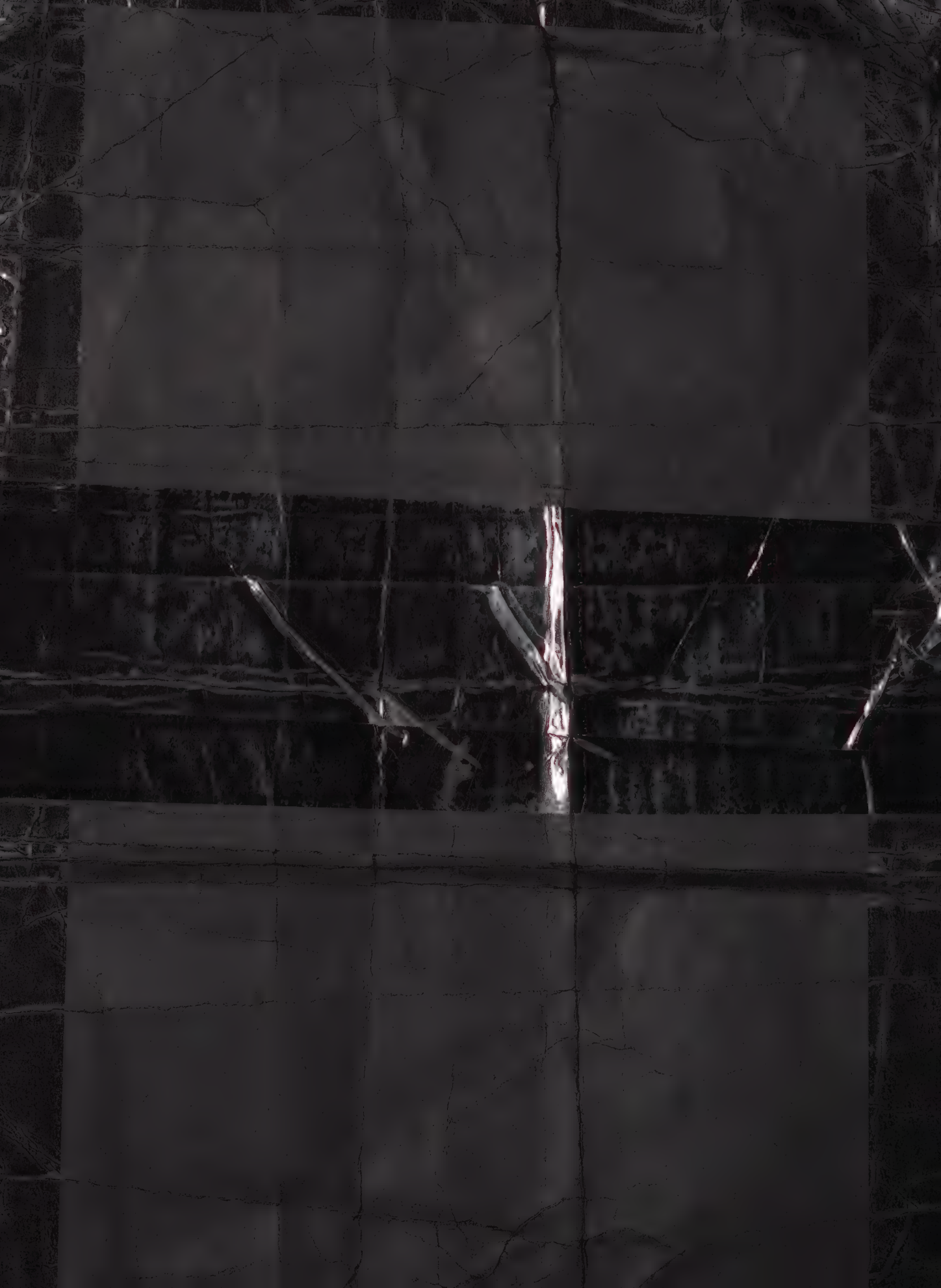



DETAIL A
CIRCUIT DETAIL (NOTE 2)
CLOCK OSCILLATOR
GENERATED 50 kHz CLOCK SIGNAL FOR ENCODER/DECODER U301 Y301 CONTROLS Q304 FREQUENCY. FEEDBACK PATH FROM U301–4 VIA C322 AND Y301.
+11.0V
Q316 M9653
Y301
R335 470K
C323 .0047
R334 15K
C324 AND R331 HOLDS PIN 1 HIGH FOR APPROX. 100 MS AFTER POWER IS APPLIED.
+4.2V
R331 100K
C324 1
CODE PLUG DETERMINES CODE WORD THAT IS GENERATED AND DECODED
TRN6005A CODE PLUG
J301
A+
PTT
SWA+
Z301
U301 CONTINUOUSLY GENERATES 23 BIT CODE WORD DURING TRANSMIT CYCLE WHEN XMIT CODE ENABLE IS HIGH. PROVIDES HIGH LEVEL AT AUDIO ENABLE OUTPUT WHEN PROPER CODE IS DETECTED DURING RECEIVE CYCLE
DUMP
CODE SELECT
OSC IN
OSC OUT
CLOCK
DATA IN
U301 ENCODER-DECODER (NOTE 5)
CODE OUT
R336 56K
SAMPLE PULSES
XMIT CODE ENABLE
AUDIO ENABLE
GOES HIGH WHEN VALID CODE IS DECODED
R333 180K
R332 470K
ENCODER-DECODER INPUT
6.2V DC
6V P-P
~0V DC
SAMPLE PULSES
1.8 mS (TYP.)
C325 .001
U303D (NOTE 2)
10.3V
11.0V
10.5V
C344 220PF
C312 .001
U303A (NOTE 2)
U303B (NOTE 2)
R318 47K
U303-16
U303E (NOTE 2)
R315 82.5K
R316 470K
10.0V FSQ
0.1V USQ
RCVR SQUELCHED = 0 V
RCVR UNSQUELCHED = 0.6 V
U303C (NOTE 2)
R319 120K
R320 82K
R321 82K
C319 4.7
CR303
DELAYS U303C TURN-OFF ONE SEC DURING FADE CONDITIONS.
CURRENT SOURCE
LOW DURING PTT
6.2V
R330 27K
C315 10
PTT INVERTER
Q309 M9643
R329 22K
R328 10K
CR305
GOES HIGH DURING PTT ENABLES U301 ENCODE FUNCTION
SW A+
AUDIO ENABLE INVERTER
R323 120K
R324 82K


SW A+
OUTPUT AMPLIFIER
ENCODER LOW-PASS FILTER
REMOVES HIGH FREQUENCY COMPONENTS FROM TURNOFF CODE AND CODE WORD SIGNALS
C331 .01
Q306 M9642
Q307 M9643
13.6V
12.2V
5.3V
5.2V
R337 100K
R338 120K
CD
CODE DISABLE (NOTE 8)
R340 100K
R341 100K
C309 .043
C308 .036
C307 0033
C332 .0056
4.7V
3.5V
CALIBRATION OUTPUT (WITH U301-9 LOW)
61 V TYPICAL FOR 750 Hz DEVIATION (NOTE 6)
CODE WORD (WITH U301-9 HIGH)
R342 2K
CODE LEVEL SET (NOTE 6)
R352 22K
C306 15
4.2V
BRN-ORG
C329 .0056
TO Q315 BASE
HIGH WHEN VALID CODE IS DETECTED UNSQUELCHES RCVR AUDIO
RCVR SQUELCHED= 0.3V
RCVR SQUELCHED= 3.9V
GRY
C314 .01
Q311 M9642 SQUELCH SWITCH
ORG-RED
D
C

EEPS-23520-O





"DIGITAL PRIVATE-LINE" ENCODER/DECODER

MODEL TRN6906A

FUNCTION

Encodes and decodes "Digital Private-Line" codes. Encoder modulates transmitter. Decoder detects received tone and unsquelches receiver when proper code is received.

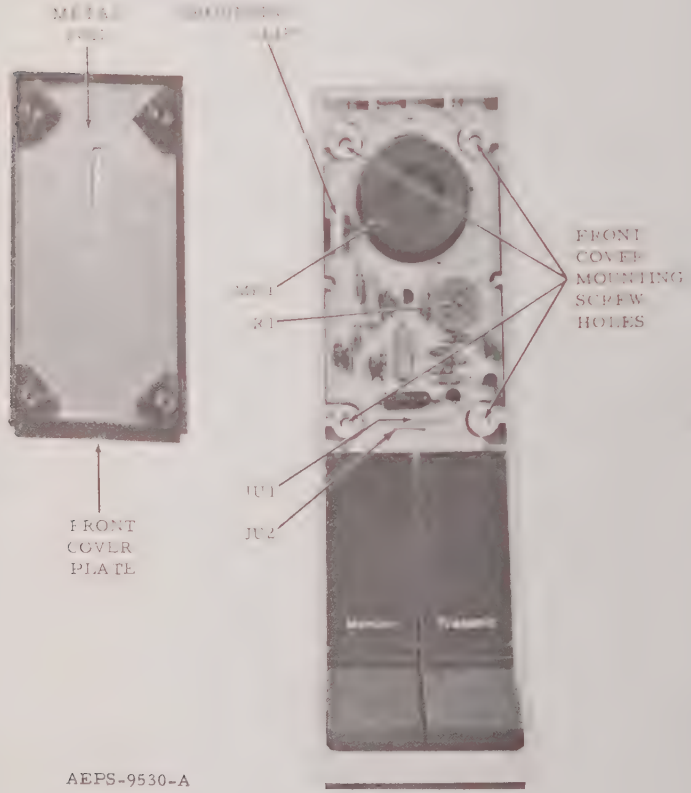
68P81034E53-O
(Sheet 2 of 2)
3/31/77-NPC

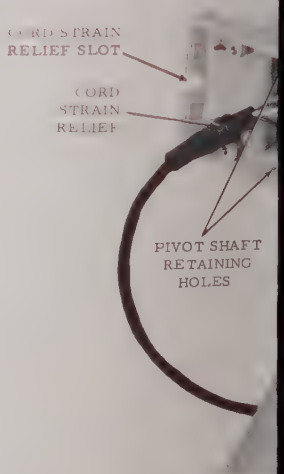
DESK MICROPHONES

MODELS TMN1008A-TMN1011A & TMN1018A

FUNCTION

The desk microphones provide a desk surface self-supporting stand to mount the PTT and PL monitor switches and to support the dynamic cartioid microphone element at mouth level. The TMN1008A and TMN1010A are used in "Private-Line" squelch systems and provide both PTT and monitor switches; the TMN1009A and TMN1011A are used with carrier squelch systems and use only the PTT switch. The TMN1018A is used in paging applications and includes both PTT and monitor switches.





AEPS-9530-A

68P81030E06-D
3/31/77-NPC

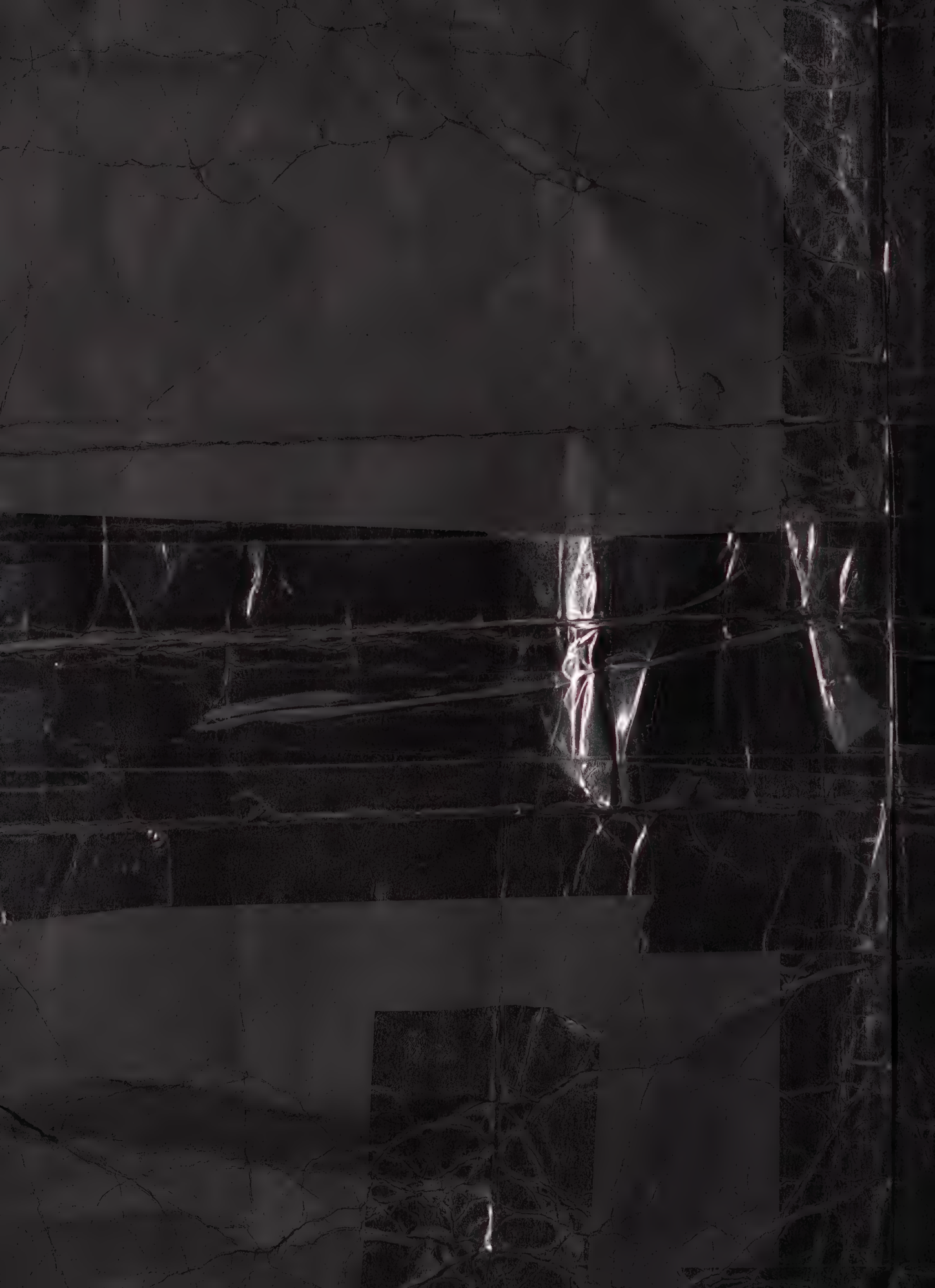
MICROPHONE DETAIL

REFERENCE SYMBOL	MOTOR PART

PARTS LIST

TRN6029A & TLN492

C1	21-821
C2	8-8298
C3	21-821
C4	23-84
C5	21-821
C6	8-8298
C7	21-821
MK1	59-84
Q1	48-869
Q2, 3	48-86
R1	18-830
R2	6-1292
R3	6-1278
R4	6-1241
R5	6-1296
R7	6-1297
R8	6-1318
R9	6-1292
R11	6-1297
NON-	
	5-8437
	42-847



OLA NO.	DESCRIPTION
A Microphone Circuit Board PL-3510-O	
	CAPACITOR, fixed: uF ±10%
87B08	220 pF; 500 V
7E11	.022; 80 V
87B44	.001; 100 V
62H09	15; ±20%; 20 V
87B44	.001; 100 V
7E02	.047; 200 V
87B45	470 pF; 500 V
	CARTRIDGE, microphone:
40E01	miniature
	TRANSISTOR: (SEE NOTE)
571	PNP; type M9571
594	NPN; type M9594
	RESISTOR, fixed: ±10%; 1/4 W; unl. stated
83G34	variable; 1.5 meg ±30%
26	100k
05	15k
14	470k ±5%
68	10k ±5%
07	2.7k ±5%
58	270k ±5%
31	3.3k
53	100
REFERENCED ITEMS	
1E01	GROMMET, cartridge
24E01	CLIP, grounding

AEPS-9528-C

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION

PARTS LIST

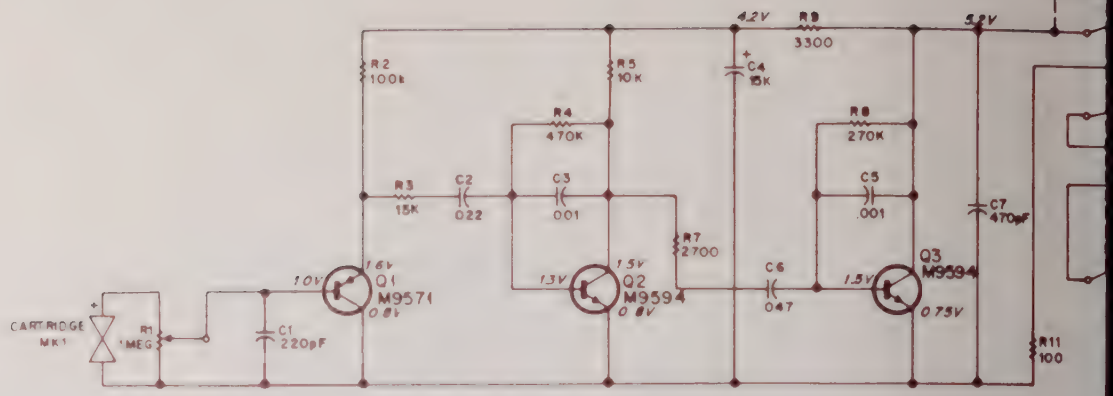
THN6254A (PL), & THN6255A (Carrier Squelch),
THN6320A (Paging)
Microphone Housing & Hardware Kit PL-3573-B

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
S1, 2	40-84711E03	SWITCH, leaf assembly S1 has 1 form A, 1 form B and 1 form C. S2 has 1 form A and 1 form B (THN6254A and THN6320A)
S1	40-84711E02	assembly includes 1 form A and 1 form B (THN6255A)
NON-REFERENCED ITEMS		
	3-136676	SCREW, switch mtg. 4-40 x 1/4 pnl hex
	1-80779B59	CABLE ASSEMBLY includes: connector, 28-83372F02
	15-84186E01	COVER, front
	15-84188E01	COVER, rear
	15-84191E01	HOUSING
	26-84720E01	FOIL, grounding, front cover
	26-84721E01	FOIL, grounding, rear cover
	38-84184E02	BUTTON, left hand (THN6154A
	38-84184E01	BUTTON, left hand (THN6155A
	38-84192E01	BUTTON, right hand
	42-84725E01	CLIP, retainer
	47-84193E01	SHAFT
	47-84194E01	SHAFT EXTENSION
	47-84723E01	SHAFT COUPLING (THN6154A only)
	22-82591C05	PIN, roll (THN6154A only)
	64-84183E01	PLATE, base
	75-84722E01	PAD, base plate
	3-138809	BASE PLATE SCREW 4-40 x 5/16 phl bn hx bk ox
	3-138810	FRONT COVER SCREW 4-40 5/8 phl bn hx bk ox
	4-10058B10	WASHER (TEFLON")

THN6252A (PL) & THN6253A (Carrier Squelch)
Microphone Housing & Hardware Kit PL-3511-

REFERENCE SYMBOL	MOTOROLA PART NO	DESCRIPTION
S1, 2	40-84711E03	SWITCH, leaf assembly S1 has 1 form A, 1 form B and 1 form C: S2 h 1 form A and 1 form B (THN6252A
S1	40-84711E02	assembly includes 1 form 1 form B and 1 form C (THN6253A)
NON-REFERENCED ITEMS		
	3-136676	SCREW, switch mtg. 4-40 x 1/4 pnl hex
	1-80780B29	CABLE ASSEMBLY [illegible]
	15-84186E01	COVER, front
	15-84188E01	COVER, rear
	15-84191E01	HOUSING
	26-84720E01	FOIL, grounding, front [illegible]
	26-84721E01	FOIL, grounding, rear cove
	38-84184E02	BUTTON, [illegible]
	38-84184E01	BUTTON, [illegible]tor" (THN62
	38-84192E01	BUTTON, [illegible]
	42-84725E01	CLIP, shaft retainer
	47-84193E01	SHAFT, [illegible]
	47-84194E01	SHAFT EXTENSION
	47-84723E01	SHAFT [illegible]
	22-82591C05	[illegible]
	64-84183E01	PLATE, base
	75-84722E01	[illegible] base plate
	3-138809	[illegible]
	3-138810	[illegible]
	4-10058B10	[illegible]

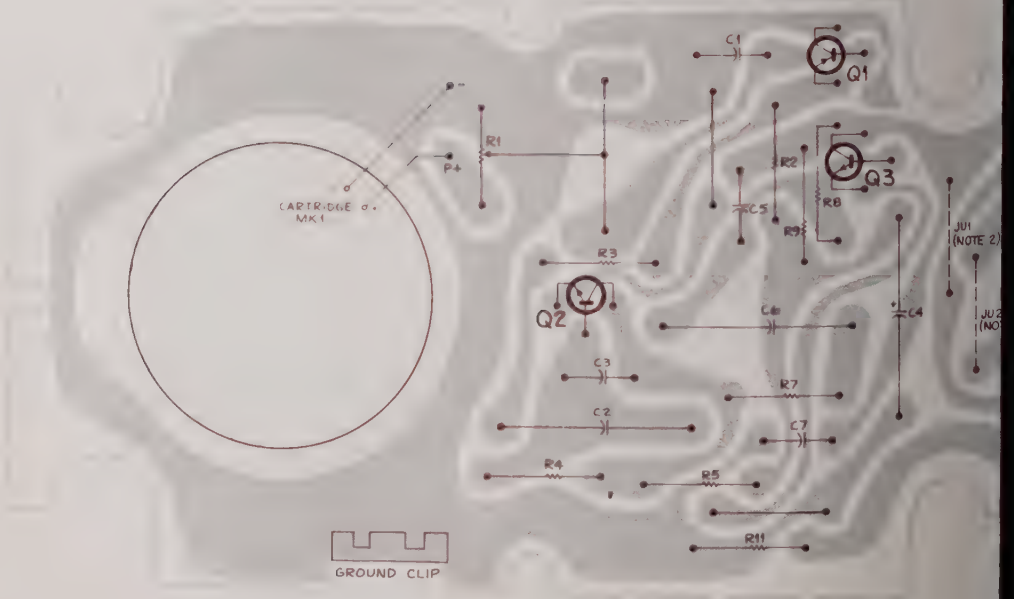
NOTE Replacement [illegible] part number [illegible]



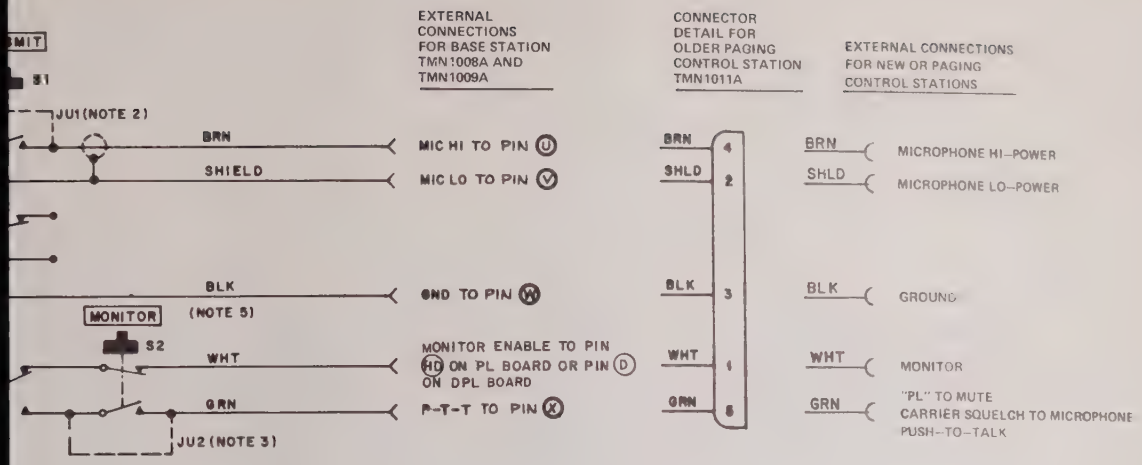
NOTES

1. UNLESS OTHERWISE STATED
   ALL CAPACITOR VALUES ARE IN MICROFARADS
2. REMOVE J1 FOR PARALLEL MIC OPERATION
3. JU1 & JU2 MAY BE REMOVED TO ENSURE THAT THE OPERATION MUST BE ON THE CHANNEL (FCC REQUIREMENT). A VOLTAGE ACROSS BOTH THE MONITOR AND TRANSMIT FUNCTIONS MUST BE PRESENT TO TRANSMIT RELEASING EITHER SWITCH ENDS THE TRANSMISSION
4. ALL DC VOLTAGE READINGS ARE WITH RESPECT TO THE MIC LO LEAD
5. MONITOR SWITCH S2 IS PRESENT IN MODEL TMN1008A & TMN1010A ONLY

TMN1010A	TMN1011A
1	1
1	1



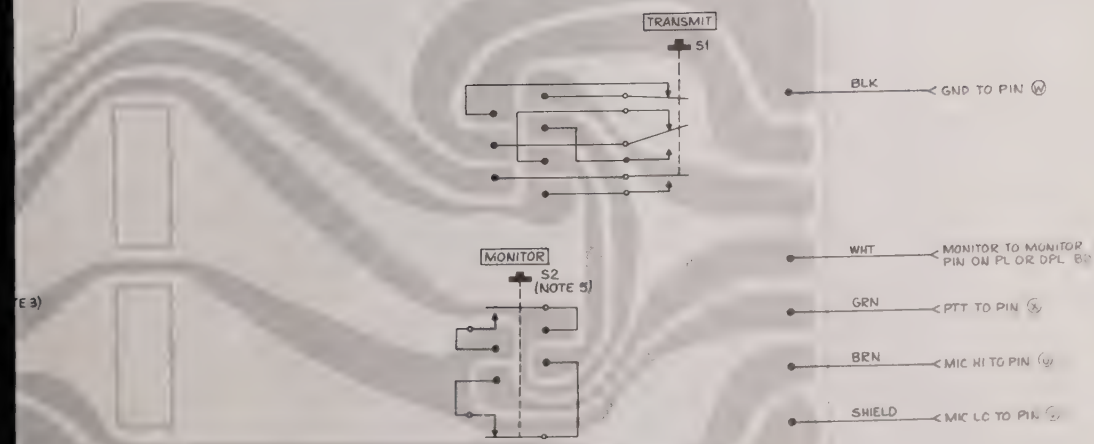
TRANSISTOR DETAIL



DEPS-17648-D

DESK MICROPHONE MODEL COMPLEMENT

TMN1008A	TMN1009A	TMN1018A	DESCRIPTION	VERSION
	1		TLN4925A MICROPHONE CIRCUIT BOARD	2
1		1	TRN6029A MICROPHONE CIRCUIT BOARD	0
1			THN6252A MICROPHONE HOUSING AND HARDWARE KIT	0
	1		THN6253A MICROPHONE HOUSING AND HARDWARE KIT	0
			THN6254A MICROPHONE HOUSING AND HARDWARE KIT	0
			THN6255A MICROPHONE HOUSING AND HARDWARE KIT	0
		1	THN6320A MICROPHONE HOUSING AND HARDWARE KIT	0



N FROM COMPONENT SIDE

OL-DEPS-17641-A

B227 OPTION

2 PPM TRANSMIT FREQUENCY STABILITY

1. DESCRIPTION

1.1 Option B227 increases the transmitter frequency stability of the UHF MOXY radio from 5 ppm (parts per million) to 2 ppm to comply with FCC base station requirements. To accomplish this, high stability crystal ovens are used, the crystal temperature regulator circuit is modified and a heater control board is added to provide separate temperature control for the receiver crystal heaters.

NOTE

Transmitter 2 ppm stability is not required if the MOXY transceiver is operated as a fixed site mobile communicating with another mobile through a repeater.

1.2 Refer to the partial schematic diagram and parts list for details of the modified temperature regulator circuit. The differential amplifier Q123, Q124 controls the drive to Q125 which in turn controls the current to transmitter oven heaters R135 and R140 keeping the transmitter oven temperature at +74°C. If the ambient temperature drops below approximately +10°C, the voltage drop across R135 and R140 becomes sufficient to overcome the cutoff bias developed by CR117. This turns on Darlington amplifier Q126 on the heater control board. This amplifier supplies drive to the heaters in the receiver crystal oven. The bias for the differential amplifier (+5.7 V) is derived from the power control driver regulator and is regulated at 9.1 V below A+.

2. INSTALLATION

Radios with B227 option are installed as described in the UHF MOXY instruction manual with one added precaution:

The radio must be allowed to warm up 15 minutes to stabilize operating temperature before making SWR measurments.

3. ALIGNMENT

3.1 Radios with the B227 option should only be aligned if powered by the TPN1136A Base Station Power Supply. If one is not available, set the output of the dc supply used for 14.8 V dc.

3.2 Allow 15 minutes warmup time to stabilize the crystal operating temperature before making any adjustments.

3.3 If the oven cover has been removed to inspect or change transmitter crystals, make sure that the cover is replaced properly. A slight downward pressure will be required to set the cover firmly in place. Replace the holddown clip.

NOTE

The 2 ppm frequency stability option (B227) imposes several restrictions on radio operation.

1. Radio must be operated inside housing with all knobs, etc. in place.
2. The radio should be mounted in basically a horizontal position.
3. The radio must be powered by a TPN1136A base station power supply.

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Communications Division

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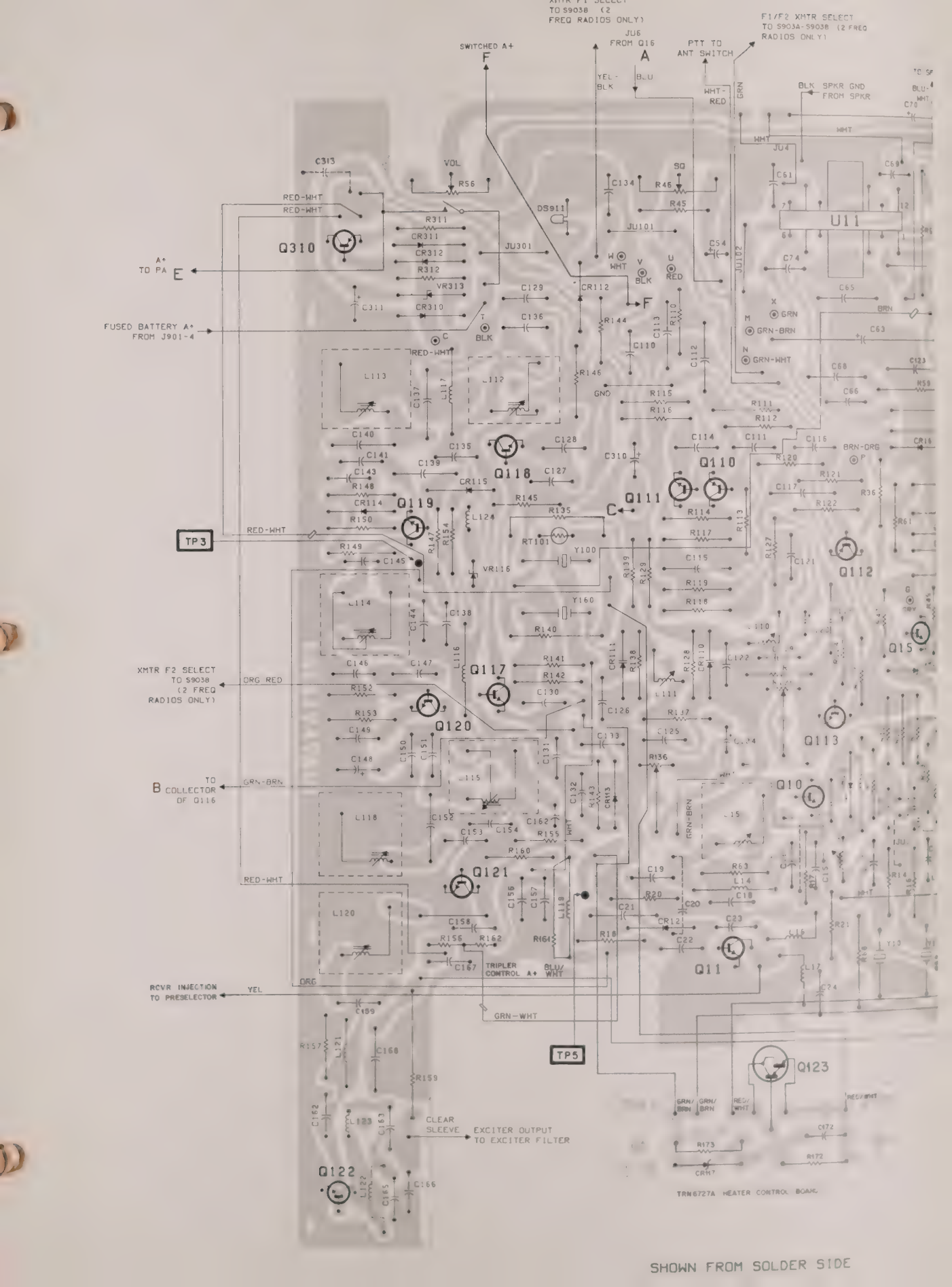
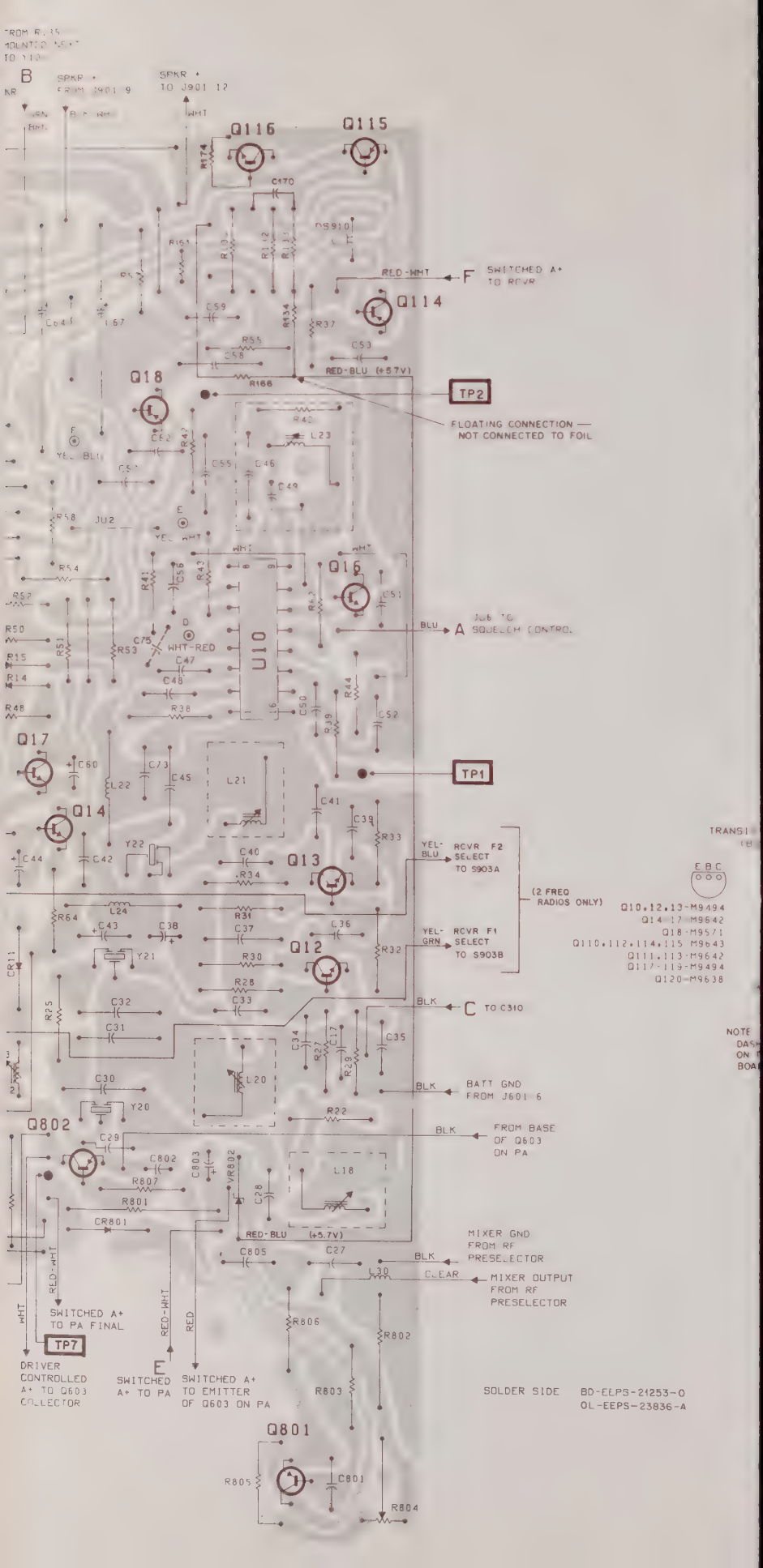
68P81035E29-O
5/25/77-NPC



SHOWN FROM SOLDER SIDE



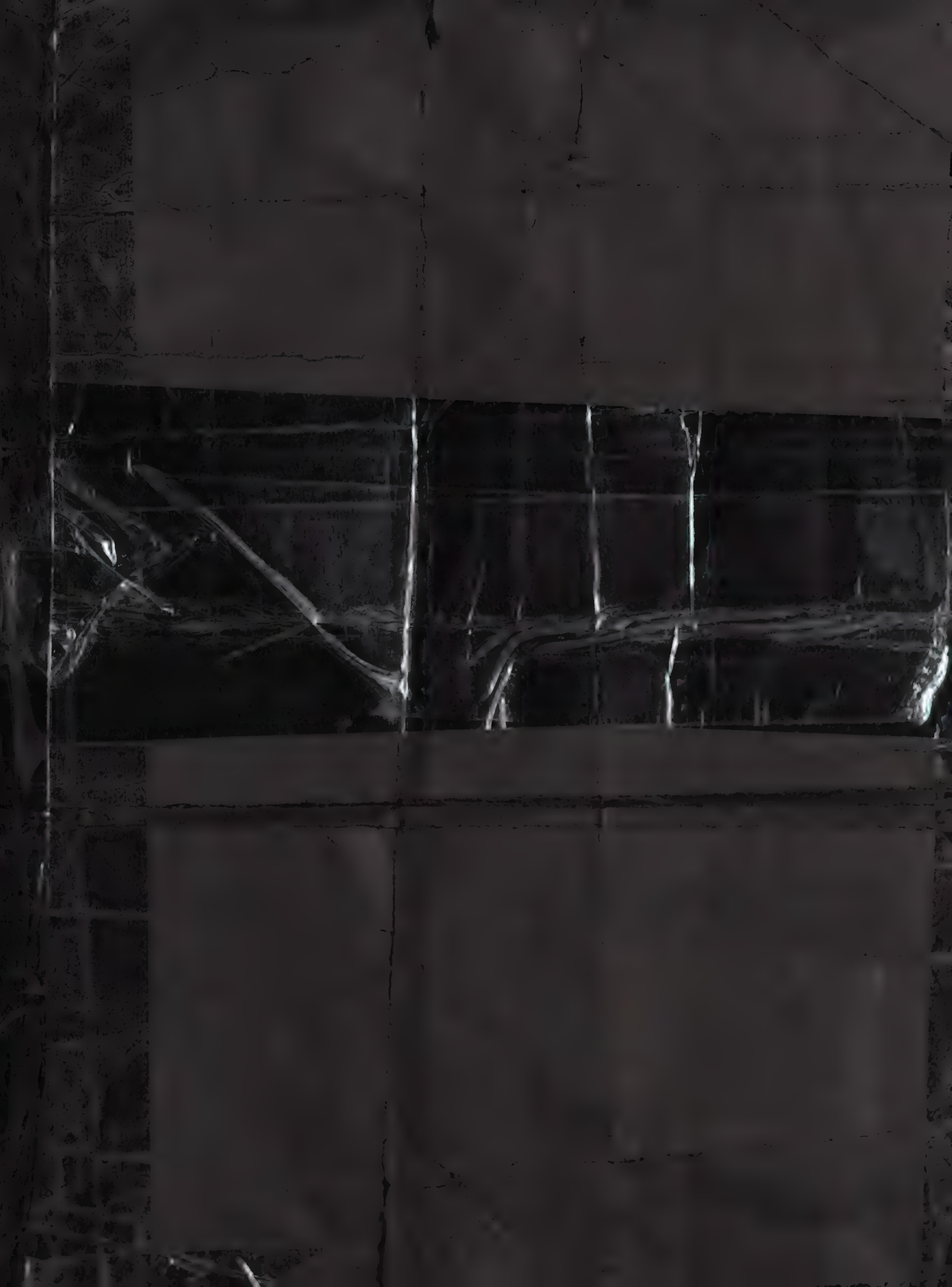
TRANSI

E B C

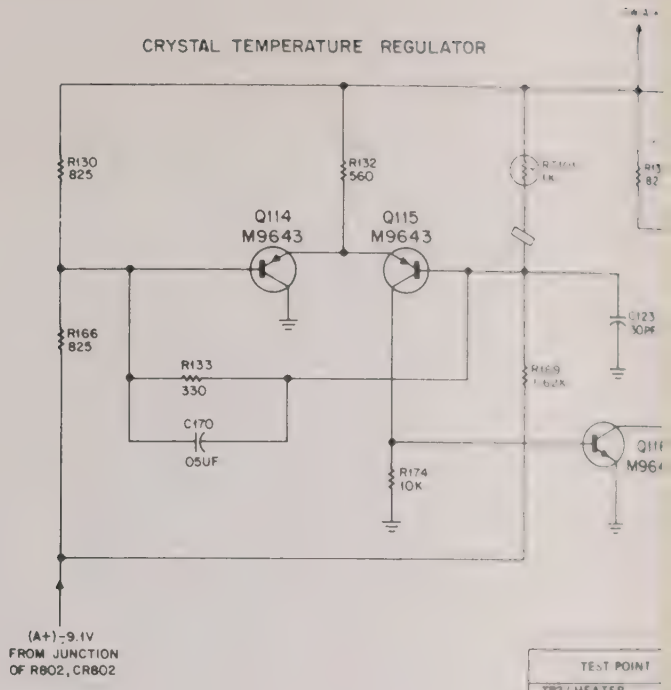
Q10,12,13-M9494
Q14-17-M9642
Q18-M9571
Q110,112,114,115-M9643
Q111,113-M9642
Q117-119-M9494
Q120-M9638

NOTE
DASH
ON T
BOA

SOLDER SIDE BD-EEPS-21253-0
OL-EEPS-23836-A

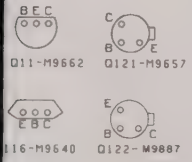


CRYSTAL TEMPERATURE REGULATOR



TEST POINT
TP3 (HEATER CONTROL BOARD)
TP2 (HEATER CONTROL BOARD)

OR BASE DETAILS
TTOM VIEWS)



ED COMPONENTS ARE LOCATED
HE SOLDER SIDE OF THE CIRCUIT
D

REFERENCE SYMBOL	MOTOROLA PART NO.	DE

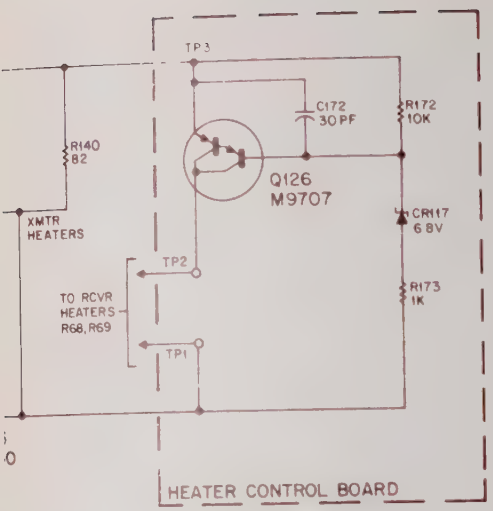
PARTS LIST

TRN6727A Heater Control Board

		CAPACIT
C123	21-8340[illegible]	[illegible] pF [illegible]
C170	21-82372C04	[illegible]
C172	21-8340[illegible]	[illegible] pF [illegible]
		[illegible]
CR117	48-834[illegible]	[illegible]
		TRANSIS
Q114, 115	48-[illegible]43	[illegible]
Q116	48-[illegible]	[illegible]
Q126	48-[illegible]	[illegible]
		[illegible]
R130, 166	[illegible]4444A[illegible]2	[illegible]
R132	[illegible]124A4[illegible]	[illegible]
R133	[illegible]124A[illegible]	[illegible]
R135, 140	[illegible]12[illegible]	[illegible]
R169	[illegible]137[illegible]	[illegible]
R172	[illegible]124A[illegible]	[illegible]
R173	[illegible]124A4[illegible]	[illegible]
R174	[illegible]124A[illegible]	[illegible]
		[illegible]
RT101	[illegible]	[illegible]
	[illegible]	
	[illegible]	[illegible]

NOTE:

Replacement diodes and transis[illegible]
Motorola part number only for opti[illegible]



CEPS-21252-A

VOLTAGE CHART

AT 25°C (77°F) AMBIENT TEMPERATURE

	REFERENCE	VOLTAGE
	TP1 (HEATER CONTROL BOARD	6.0 TO 8.0 VOLTS
	TP1 (HEATER CONTROL BOARD	LESS THAN 0.3 VOLTS

SCRIPTION

PL-4343-B

R, fixed:
500 V: N150
20%: 25 V
500 V: N150

E NOTE)
6.8 V

R: (SEE NOTE)
3
0
pair: M9707

fixed:
4 W
4 W
4 W
W
1/4 W
4 W
W
4 W

OR:

EAD: 0.74 uH min.

be ordered by
erformance.

Option B227 2 PPM Transmit Frequency Stability Partial Schematic Diagram and Circuit Board Detail
Motorola No. PEPS-23838-O
5/25/77-NPC

B227 OPTION

HANDLING PRECAUTIONS FOR CMOS INTEGRATED CIRCUITS

Many of the integrated circuit devices used in communications equipment are of the CMOS (Complementary Metal Oxide Semiconductor) type. Because of their high open circuit impedance, CMOS ICs are vulnerable to damage from static charges. Care must be taken in handling, shipping, and servicing them and the assemblies in which they are used.

Even though protection devices are provided in CMOS IC inputs, the protection is effective only against overvoltage in the hundreds of volts range such as are encountered in an operating system. In a system, circuit elements distribute static charges and load the CMOS circuits, decreasing the chance of damage. However, CMOS circuits can be damaged by improper handling of the modules even in a system.

To avoid damage to circuits, observe the following handling, shipping, and servicing precautions:

(1) Prior to and while servicing a circuit module, particularly after moving within the service area, momentarily touch both hands to a bare metal earth grounded surface. This will discharge any static charge which may have accumulated on the person doing the servicing.

(2) Whenever possible avoid touching any electrically conductive parts of the circuit module with your hands.

(3) Normally, circuit modules can be inserted or removed with power applied to the unit. However, check the INSTALLATION and MAINTENANCE sections of the manual as well as the module schematic diagram to insure there are no objections to this practice.

(4) When servicing a circuit module, avoid carpeted areas, dry environments, and certain types of clothing (silk, nylon, etc.) because they contribute to static buildup.

(5) All electrically powered test equipment should be grounded. Apply the ground lead from the test equipment to the circuit module before connecting the test probe. Similarly, disconnect the test probe prior to removing the ground lead.

(6) If a circuit module is removed from the system, it is desirable to lay it on a conductive surface (such as a sheet of aluminum foil) which is connected to ground through a resistance of approximately 100k.

WARNING

If the aluminum foil is connected directly to ground, be cautious of possible electrical shock from contacting the foil at the same time as other electrical circuits.

(7) When soldering, be sure the soldering iron is grounded.

(8) Prior to connecting jumpers, replacing circuit components, or touching CMOS pins (if this becomes necessary in the replacement of an integrated circuit device), be sure to discharge any static buildup as described in procedure 1. Since voltage differences can exist across the human body, it is recommended that only one hand be used if it is necessary to touch pins on the CMOS device and associated board wiring.

(9) When replacing a CMOS integrated circuit device, leave the device in its metal rail container or conductive foam until it is to be inserted into the printed circuit module.

(10) All low impedance test equipment (such as pulse generators, etc.) should be connected to CMOS device inputs after power is applied to the CMOS circuitry. Similarly, such low impedance equipment should be disconnected before power is turned off.

(11) Replacement modules shipped separately from the factory will be packaged in a conductive material. Any modules being transported from one area to another should be wrapped in a similar material (aluminum foil may be used). NEVER USE NONCONDUCTIVE MATERIAL for packaging these modules.

MOXY
Two-Way FM Radio
450-470 MHz

68P81034E60-O